





W3 P517 1941

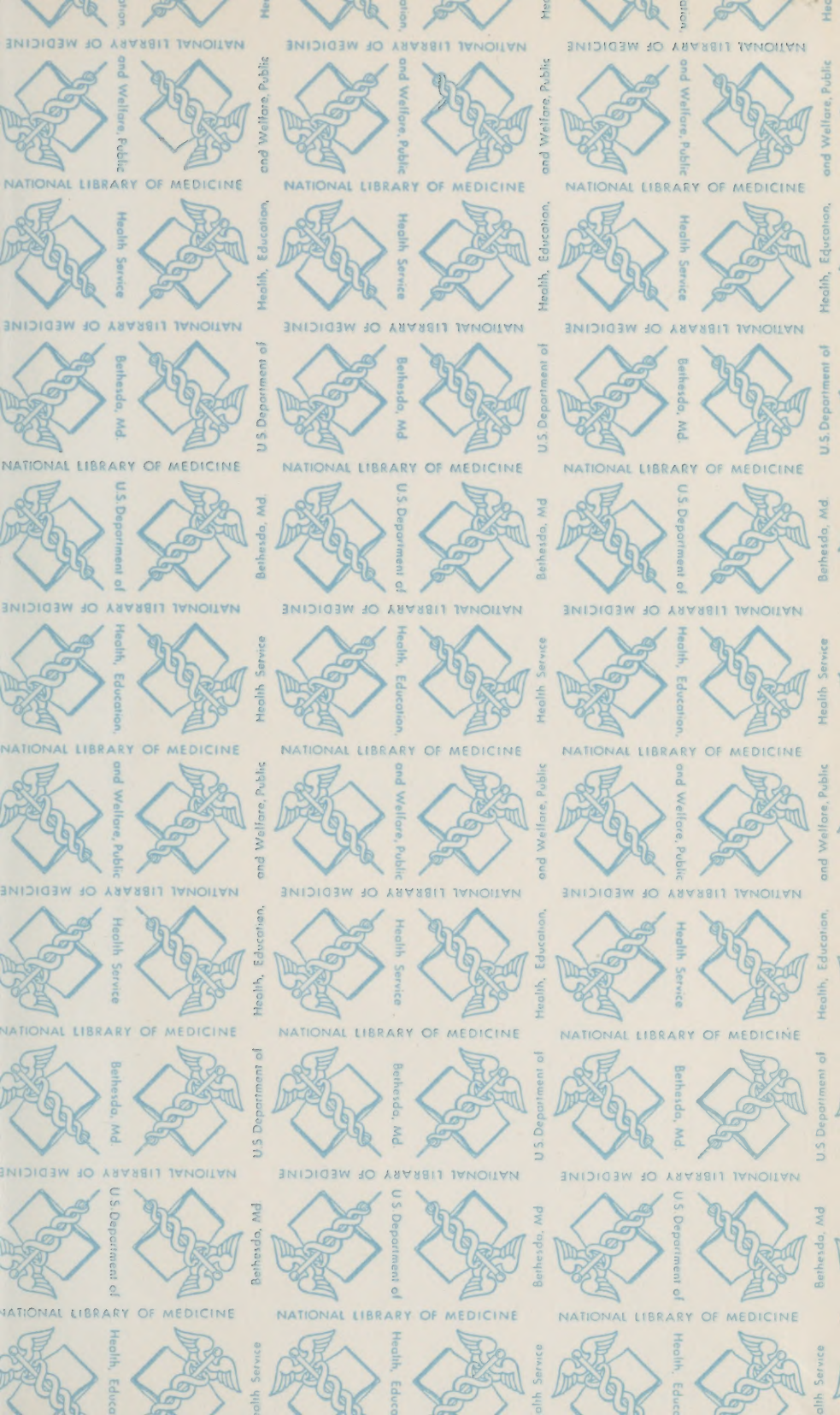
24810050R



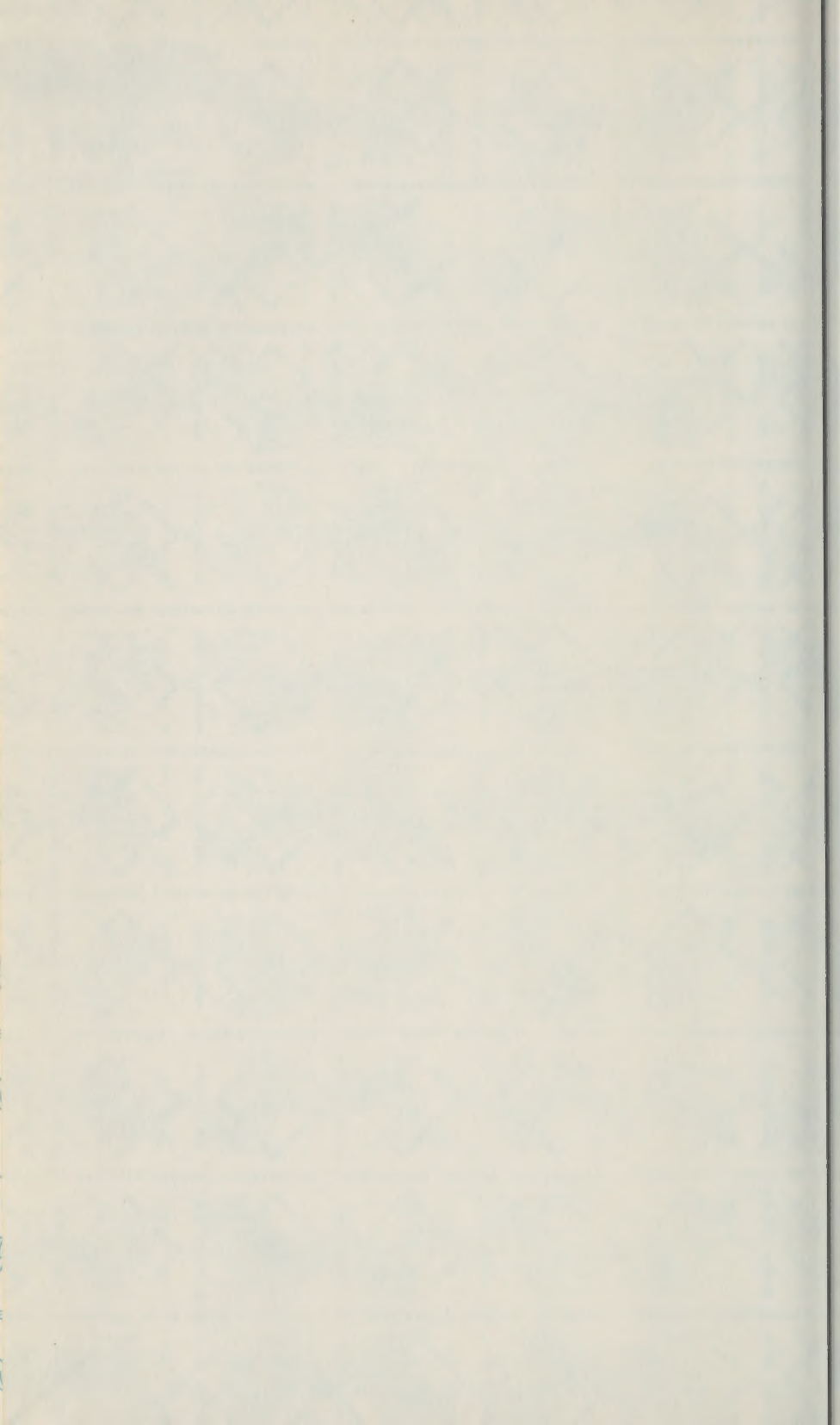
NLM 05126611 9

NATIONAL LIBRARY OF MEDICINE













NOV 12 1941

---

COMMONWEALTH OF PENNSYLVANIA,

DEPARTMENT OF HEALTH,

JOHN J. SHAW, M. D., Secretary

---

**SYMPOSIUM ON ANTHRAX**



nsylvania. BUREAU OF INDUSTRIAL HYGIENE

WM. B. FULTON, M. D., M. P. H., Director

---

HARRISBURG, PENNSYLVANIA

April 1, 1941

---

nphlet

121  
6 P4

W3  
PE517  
1941  
C.1

NATIONAL LIBRARY OF MEDICINE  
WASHINGTON, D. C.



COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF HEALTH

*Bureau of industrial hygiene.*  
**SYMPOSIUM ON ANTHRAX**

By

WILLIAM B. FULTON, M.D., M.P.H., Director,  
JOSEPH F. MELLOR, JR., Engineer,  
WILLIAM H. KRECKER, JR., Engineer,  
Bureau of Industrial Hygiene,  
Pennsylvania Department of Health

and

HENRY FIELD SMYTH, M.D., Dr. P.H.,  
Professor of Industrial Hygiene,  
University of Pennsylvania

and

PASCAL F. LUCCHESI, M.D.,  
Superintendent and Medical Director,  
Philadelphia Hospital for Contagious Diseases

and

NATHANIEL GILDERSLEEVE, M.D.,  
Chief Resident Physician  
Philadelphia Hospital for Contagious Diseases

and

IVOR GRIFFITH, Ph. M., Sc.D., F.R.S.,  
Research Director,  
John B. Stetson Company

and

HARRY D. IMMEL, Director,  
Bureau of Inspection,  
Pennsylvania Department of Labor and Industry

---

From the Bureau of Industrial Hygiene  
Pennsylvania Department of Health

---

Harrisburg, Pennsylvania

April 1, 1941

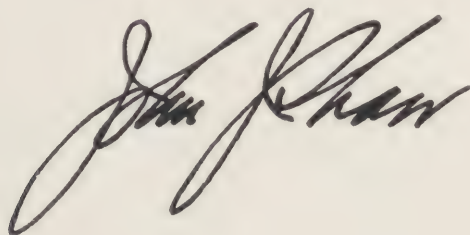
RA644  
. A6P4

## FOREWORD

This bulletin contains papers which were presented at a symposium on anthrax held on November 19, 1940, at the Philadelphia County Medical Society Building under the joint sponsorship of the Bureau of Industrial Hygiene, Pennsylvania Department of Health, and the Philadelphia City Department of Public Health. Dr. Hubley R. Owen, Director, Philadelphia City Department of Public Health, presided.

I want to take this opportunity, on behalf of the State Department of Health, to express my appreciation for the interest shown by those who attended as representatives of Philadelphia industries engaged in the manufacture or handling of hair, wool, hides, skins and similar animal products.

It is my hope that, as a result of this meeting and the publication of these papers, a better knowledge of anthrax among industrial workers may be had and that this knowledge will result in a reduced incidence of this disease.

A handwritten signature in dark ink, appearing to read "John J. Khan". The signature is fluid and cursive, with a large loop at the end of the last name.





## TABLE OF CONTENTS

	Page
Foreword .....	iii
An Epidemiological Study of Anthrax in Philadelphia .....	1
<div style="padding-left: 2em;">Wm. B. Fulton, M. D., M. P. H., Director,</div> <div style="padding-left: 2em;">Jos. F. Mellor, Jr., Engineer,</div> <div style="padding-left: 2em;">Wm. H. Kreckler, Jr., Engineer,</div> <div style="padding-left: 2em;">Bureau of Industrial Hygiene,</div> <div style="padding-left: 2em;">Pennsylvania Department of Health.</div>	
A Twenty Year Survey of Anthrax in the United States .....	13
<div style="padding-left: 2em;">Henry Field Smyth, M. D., Dr. P. H.,</div> <div style="padding-left: 2em;">Professor of Industrial Hygiene,</div> <div style="padding-left: 2em;">University of Pennsylvania.</div>	
The Treatment of Anthrax .....	29
<div style="padding-left: 2em;">Pascal F. Lucchesi, M. D.,</div> <div style="padding-left: 2em;">Superintendent and Medical Director,</div> <div style="padding-left: 2em;">Philadelphia Hospital for Contagious Diseases.</div> <div style="padding-left: 2em;">Nathaniel Gildersleeve, M. D.,</div> <div style="padding-left: 2em;">Chief Resident Physician,</div> <div style="padding-left: 2em;">Philadelphia Hospital for Contagious Diseases.</div>	
Anthrax in the Fur-Felt Hat Industry .....	34
<div style="padding-left: 2em;">Ivor Griffith, Ph. M., Sc. D., F. R. S.,</div> <div style="padding-left: 2em;">Research Director, John B. Stetson Company.</div>	
The Enforcement Problem .....	39
<div style="padding-left: 2em;">Harry D. Immel, Director,</div> <div style="padding-left: 2em;">Bureau of Inspection,</div> <div style="padding-left: 2em;">Pennsylvania Department of Labor &amp; Industry.</div>	
Discussion .....	43
<div style="padding-left: 2em;">O. F. Hedley, M. D.,</div> <div style="padding-left: 2em;">Division of Industrial Hygiene,</div> <div style="padding-left: 2em;">National Institute of Health.</div>	





# AN EPIDEMIOLOGICAL STUDY OF ANTHRAX IN PHILADELPHIA

By

WILLIAM B. FULTON, M.D., M.P.H., Director,

JOSEPH F. MELLOR, JR., Engineer,

WILLIAM H. KRECKER, JR., Engineer

Bureau of Industrial Hygiene, Pennsylvania Department of Health,  
Harrisburg, Pennsylvania

During the past two years there has been an increase in the number of cases of human anthrax of occupational origin in Philadelphia. This increased incidence is not peculiar to Philadelphia, for there also has been a similar increase in the number of cases reported in New Jersey and in New York. The increase prompted the Director of the Philadelphia Department of Public Health to request the cooperation and assistance of the Bureau of Industrial Hygiene of the Pennsylvania State Department of Health in an effort to control the occupational anthrax problem. Accordingly, arrangements were made to conduct a cooperative study.

This paper is concerned with the results of an epidemiological study of occupational anthrax in Philadelphia during the period January 1, 1931, to October 15, 1940.

## METHODS EMPLOYED IN THE STUDY

From the reports of cases of anthrax which occurred in Philadelphia during this period, data were obtained concerning the number of cases, date of occurrence, name of employer, source of infection, site of lesion, and prognosis of the case. After these data had been obtained, sanitary engineers of the Bureau of Industrial Hygiene visited each plant in which one or more cases of anthrax had occurred since January 1, 1931. A responsible official of each plant was interviewed and the following information was obtained:

1. The type of industry.
2. An appraisal of plant welfare provisions such as medical service, nursing service, etc.
3. An appraisal of sanitary facilities in the plant available to the employees.
4. The kind, source and amount of raw materials used in the plant.
5. The method of handling these materials.
6. The method of sterilization or cleaning of the raw materials at the plant.
7. The method of disposal of waste materials and by-products.
8. A record of the incidence of anthrax in the plant since January 1, 1931.

Similar information was obtained from a group of plants in which anthrax had not occurred since January 1, 1931, for the purpose of comparison. Plants in this group have been designated as the control group.

## RESULTS OF THE STUDY

A total of sixty-three cases of industrial anthrax occurred in Philadelphia during the period January 1, 1931 to October 15, 1940, all of which were hospitalized at the Philadelphia Hospital for Contagious

TABLE I

ANTHRAX MORBIDITY AND MORTALITY IN PHILADELPHIA, 1905—October 15, 1940.

(Source—Philadelphia City Department of Public Health)

Year	Cases Reported	Fatalities	Year	Cases Reported	Fatalities
1905-----	7	(1)	1926-----	15	2
1906-----	9	(1)	1927-----	8	2
1907-----	15	(1)	1928-----	16	5
1908-----	4	(1)	1929-----	14	0
1909-----	9	(1)	1930-----	7	0
1910-----	8	2	1931-----	6	0
1911-----	2	1	1932-----	2	0
1912-----	10	3	1933-----	2	0
1913-----	9	3	1934-----	4	0
1914-----	9	4	1935-----	12	0
1915-----	5	1	1936-----	8	0
1916-----	7	5	1937-----	4	0
1917-----	10	3	1938-----	2	0
1918-----	8	1	1939-----	10	0
1919-----	10	4	1940 <sup>(2)</sup> ---	10	0
1920-----	15	2			
1921-----	10	1			
1922-----	22	2			
1923-----	22	1			
1924-----	7	1			
1925-----	14	1			
			Total--	332	44

(1) No records of fatalities available from 1905-1909, inclusive.

(2) January 1 to October 15, 1940.

Diseases. None of these cases terminated fatally. As a matter of fact, there has not been a fatal case of anthrax in Philadelphia since 1928 and it is interesting to note that there has not been one case of internal anthrax reported.

Table I shows the anthrax morbidity and mortality in Philadelphia from January 1, 1905 to October 15, 1940 (according to records of the Philadelphia City Department of Public Health). Since the year 1905 there has been an average of nine cases reported per year in Philadelphia. During the first four years of the period covered in this study the number of reported cases was well below this annual average. However, the year 1935 saw a large increase in the incidence of anthrax followed by a gradual decline until 1939, when again there was a sharp rise in the number of cases reported. The year 1938 had two reported cases only, while the years 1939 and 1940 each had ten cases.

An examination of the case records disclosed that there were four general classes of industry in which this disease had occurred. They were:

1. Hair and wool industry.
2. Hide and skin industry.
3. Longshoremen and truckers.
4. Miscellaneous industries.

During the period covered by this report, as shown in Table II, the hair and wool industry had the greatest number of cases—thirty-one, or 49.2 per cent. of the total. The hide and skin industry ranked second, having had nineteen cases, or 30.2 per cent.; followed by the longshoremen and truckers with eight cases, or 12.7 per cent. The five miscellaneous cases constituted 7.9 per cent. of the total number.

TABLE II  
NUMBER AND PERCENTAGE OF ANTHRAX CASES IN PHILADELPHIA INDUSTRIES FROM  
January 1, 1931, to October 15, 1940.

Industry	Number	Percentage
Hair and wool products -----	31	49.2
Hide and skin products -----	19	30.2
Truckers and stevedores -----	8	12.7
Miscellaneous -----	5	7.9
<b>Total -----</b>	<b>63</b>	<b>100.0</b>

In the latter group, one case was the wife of a fur dealer, leopard skins being the suspected source of infection; another occurred in a technician in a biological laboratory who contracted the disease while performing an autopsy on an anthrax-inoculated animal. The third case in this group was that of a hardware clerk, who scratched his left forearm on a showcase in the store and later developed anthrax; the suspected source of infection being paint brushes. The fourth case was found in a door-to-door broom and brush salesman, and on the fifth case no occupational record could be obtained.

#### NUMBER AND SIZE OF PLANTS

Thirty-two establishments were found to have had one or more cases of anthrax during this ten-year period. Seventeen of these plants were in the hair and wool industry; seven in the hide and skin industry; three were stevedoring companies; two were trucking companies; one a biological supply laboratory; one a fur dealer; and one a hardware store. These last three establishments are not included in subsequent comparisons.

In the anthrax group, the number of employees in the hide and skin plants is slightly less than the number of employees in the hair and wool plants. The tanneries that were investigated had 2,270 employees while the hair and wool plants employed 2,625. Nine of the seventeen



plants in the hair and wool group employ less than one hundred persons as compared to three of the seven plants in the hide and skin group.

Among the twenty-six control plants investigated, the fifteen in the hair and wool industry employed 1,082 persons and the six plants in the hide and skin group employed 1,035. Two glue and fertilizer factories, two stevedoring companies, and one trucking company were also included in the control group. Employment figures of these five establishments were not obtained.

Each control plant in the hide and skin industry employed more than one hundred persons, while in the hair and wool plants seven of the fifteen plants in this group employed more than one hundred persons.

### GENERAL WELFARE PROVISIONS

Medical services were available to a greater extent in the twenty-nine establishments of the anthrax group than in the twenty-six plants of the control group as shown in Table III. Six, or 20.7 per cent. of the total number of anthrax plants have the services of a physician on a part-time basis, whereas in the control group only two, or 7.7 per cent. of the plants have part-time physicians. None of the plants had full-time physicians.

In the matter of nursing services the control group is slightly better, with two plants or 7.7 per cent. having full-time nursing service compared with one plant, or 3.5 per cent. in the anthrax group. The control group has more safety engineering services; one plant or 3.8 per cent. with a full-time engineer and three plants or 11.5 per cent. with part-time engineers. In the anthrax group only one plant has a safety engineer on a full-time basis, and none on a part-time basis. Thus, nursing and safety engineering services are provided in more plants in the control group. However, there are more safety committees in plants in the anthrax group.

TABLE III  
GENERAL WELFARE PROVISIONS.

Provisions	Anthrax Plants		Control Plants	
	Number	Percentage	Number	Percentage
Total number of plants----	29	----	26	----
Plant physician				
Full time -----	--	----	--	----
Part time -----	6	20.7	2	7.7
On call -----	10	34.5	7	30.8
Nursing service				
Full time -----	1	3.5	2	7.7
Part time -----	--	----	--	----
Safety engineer				
Full time -----	1	3.5	1	3.8
Part time -----	--	----	3	11.5
Safety committee -----	6	27.6	4	19.2

Medical, nursing and safety services were not generally available to longshoremen. It was found, however, that stevedoring companies made use of the medical services furnished by their insurance carriers, and sent employees with minor accidents to the insurance clinics. Most of the freight companies instructed their employees as to the importance of reporting cuts and scratches.

TABLE IV  
GENERAL WELFARE PROVISIONS IN THE HAIR AND WOOL AND  
HIDE AND SKIN INDUSTRIES.

Provisions	Anthrax Plants				Control Plants			
	Hair and Wool		Hide and Skin		Hair and Wool		Hide and Skin	
	No.	Percent.	No.	Percent.	No.	Percent.	No.	Percent.
Total plants ----	17	----	7	----	15	----	6	----
Plant physician								
Full time ----								
Part time ----	3	17.6	3	43.0	2	13.3	1	16.7
On call ----	6	35.3	4	57.0	3	20.0	4	66.6
Nursing service								
Full time ----	--	----	1	14.3	1	6.7	1	16.7
Part time ----	--	----	--	----	--	----	--	----
Safety engineer								
Full time ----	--	----	1	14.3	--	----	1	16.7
Part time ----	--	----	--	----	1	6.7	--	----
Safety committee	2	11.8	4	57.0	2	13.3	2	33.3

Table IV shows the percentage distribution of general welfare provisions in the hair and wool and hide and skin plants. A comparison of the anthrax plants in these industries shows that medical services were available more frequently to the hide and skin plants. A similar condition exists in the control plants.

#### SANITARY FACILITIES

Table V indicates that sanitary facilities, such as toilets, locker rooms, lunchrooms, washrooms, were found in similar numbers in both

TABLE V  
SANITARY FACILITIES.

Facility	Anthrax Plants		Control Plants	
	Number	Percentage	Number	Percentage
Total number of plants ----	29	----	26	----
Toilets in separate room --	27	93.2	25	96.2
Adequate number of toilets	26	89.6	24	92.4
Wash basins ----	23	79.4	24	92.4
Hot water ----	20	69.0	15	57.7
Towels supplied ----	6	20.7	6	23.1
Lockers ----	17	58.6	15	57.7
In separate room ----	7	41.1	10	66.6
In work room ----	11	64.7	6	40.0
Lunch room ----	5	17.2	7	26.9
Water fountains ----	14	48.3	9	34.6
Individual drinking cups --	4	13.8	4	15.4
Common cups ----	18	62.1	14	54.0

the anthrax plants and in the control plants. These facilities were generally totally lacking among longshoremen because of the transient nature of their work.

With the exception of drinking water facilities, other sanitary provisions, such as toilets, lockers and locker rooms, washrooms and lunch-rooms were available more frequently among anthrax plants in the hide and skin plants than in the hair and wool plants, as shown in Table VI. Similar conditions are found to exist in the control plants.

TABLE VI  
SANITARY FACILITIES IN THE HAIR AND WOOL AND HIDE AND SKIN INDUSTRIES.

Facility	Anthrax Plants				Control Plants			
	Hair and Wool		Hide and Skin		Hair and Wool		Hide and Skin	
	No.	Percent.	No.	Percent.	No.	Percent.	No.	Percent.
Total number of plants -----	17	----	7	----	15	----	6	----
Toilets in separate room -----	17	100.0	7	100.0	15	100.0	6	100.0
Adequate number of toilets -----	17	100.0	7	100.0	14	93.4	6	100.0
Wash basins -----	14	82.4	7	100.0	15	100.0	6	100.0
Showers -----	11	64.7	7	100.0	5	33.3	6	100.0
Hot water -----	13	76.5	7	100.0	7	46.6	6	100.0
Towels supplied -----	3	17.7	2	28.6	4	26.7	2	33.3
Lockers -----	8	47.0	6	85.8	5	33.3	5	83.4
In separate room -----	1	12.5	2	33.3	5	100.0	2	40.0
In work room -----	7	87.5	4	66.6	2	40.0	3	60.0
Lunch room provided -----	1	5.9	3	43.0	3	20.0	--	----
Water fountains -----	10	58.8	3	43.0	4	26.7	2	33.3
Individual drinking cups -----	3	17.7	--	----	2	13.3	1	16.7
Common cups -----	6	35.3	6	85.8	7	46.6	4	66.7

#### USE OF WARNING PLACARDS

Table VII shows the extent of warning placards and the extent of safe practice explanation and supervision in the anthrax and control plants. Placards, which show in natural color the appearance of the anthrax lesion in various stages and which have been made available to the industry, were found to be displayed in twelve, or 41.4 per cent. of the anthrax plants as compared to five or 19.2 per cent. of the control plants.

TABLE VII  
SAFE PRACTICES.

Group	Anthrax Plants		Control Plants	
	Number	Percentage	Number	Percentage
Total number of plants -----	29	----	26	----
Warning placards posted -----	12	41.4	5	19.2
Safe practices explained -----	21	72.5	22	84.6
Safe practices supervised -----	19	65.5	22	84.6
First aid treatment -----	27	93.2	26	100.0



Truckers have little opportunity of learning about anthrax except by experience, because in none of the trucking establishments visited could anthrax posters be found. Warning placards were posted in some of the piers, but in general little is known about the disease by longshoremen.

Comparing the hide and skin plants with the hair and wool plants in the anthrax group, an examination of Table VIII shows that anthrax posters are displayed in six or 85.8 per cent. of the hide and skin plants as compared to seven or 41.2 per cent. of the hair and wool plants.

TABLE VIII  
SAFE PRACTICES.

Group	Anthrax Plants				Control Plants			
	Hair and Wool		Hide and Skin		Hair and Wool		Hide and Skin	
	No.	Percent.	No.	Percent.	No.	Percent.	No.	Percent.
Total number of plants -----	17	----	7	----	15	----	6	----
Warning placards posted -----	7	41.2	6	85.8	2	13.3	2	33.3
Safe practices explained -----	14	82.4	7	100.0	14	93.4	5	83.4
Safe practices supervised -----	14	82.4	7	100.0	13	86.7	5	83.4
First aid treatment -----	17	100.0	7	100.0	15	100.0	6	100.0

#### REPORTING OF ANTHRAX LESIONS

It was found that in the hide and skin plants the anthrax infection was reported more promptly than in the hair and wool plants. In the latter group an average time of three days elapsed between the time of the appearance of the lesion and the time of reporting. It was also found that in those plants having plant physicians the average elapsed time between the date when the lesion was first observed by the employee and the date of reporting was 2.6 days as compared with an average elapsed time of 4.2 days in plants not having plant physicians.

#### ANTHRAX IN THE HIDE AND SKIN INDUSTRY

During the past ten years the anthrax plants in the hide and skin industry reported that they had used approximately thirteen million hides or skins a year—98.5 per cent. of which were goat skins. These were imported from India, Mexico, Argentina, Nigeria, Brazil and the British West Indies. The skins are received at the plants usually in a hard dry condition. A few plants receive wet salted skins. In addition to the goat skins, a small number of cabretta skins and kangaroo skins are processed.

The goat skins arrive in Philadelphia either direct by steamer or by truck or rail freight from New York. Flint-cured hides are usually shipped in open bales. The dry salted skins are shipped either in open or in rattan—or burlap-covered bales, depending upon the country of

origin. The cabrettas are generally wet salted and are packed in barrels or casks.

The goat skins are received unhaired and untrimmed and usually have a bit of the hard, dry, fatty matter (fleshings) remaining on the skin.

The water and lime used in the preliminary soaking operations are usually dumped directly into the city sewers. In some plants the lime sludge is separated and removed to a dump. Bale coverings and wrappings are burned. The fleshings and trimmings as well as the tanned trimmings and dust from the buffing operation are sold to glue factories and fertilizer companies. The hair is sold to hair works where it is washed and dried and then resold to the hair and wool industry.

Effective February 1, 1940, practically all the regulations affecting potentially-infected anthrax material which had been enforced by the United States Bureau of Animal Industry, were lifted. This resulted in the discontinuance of the practice of chlorinating waste water and other preventive measures contained in the regulations for the control of anthrax.

In the control plants in the hide and skin industry, it was found that most of the materials handled were largely of domestic origin or from the South American countries. Goat skins comprised only a small part of the raw materials handled, the others being sheepskins, cattle hides and kip skins.

The anthrax lesion in persons employed in the hide and skin industry occurred most frequently on the head and neck. Six, or 31.6 per cent. occurred on the head; four or 21.0 per cent. on the neck; and three or 15.8 per cent. on the forearm, the lesion occurring on other parts of the body in the remaining cases.

Anthrax in the hide and skin industry occurred usually among employees in the beamhouse and warehouse. Only one case occurred in subsequent operations, this being a shipper who was loading a truck with finished goods.

#### ANTHRAX IN THE HAIR AND WOOL INDUSTRY

In the earlier years of the period covered in this survey, the annual incidence of anthrax in the hair and wool industry followed the same trend as that in the hide and skin industry. In 1938 only two cases of anthrax were reported, one in the hide and skin industry and one in the hair and wool industry. In 1939, however, six cases developed in the hair and wool industry and nine cases during the first nine and one-half months of 1940.

It was not possible to establish a relationship between the incidence of anthrax in any particular plant and the total quantity of raw materials imported from a specific foreign country. However, the sources of the raw materials imported were determined for each plant.

In the hair and wool plants in which anthrax has occurred, the raw materials were imported from India, China, Egypt and the South American countries. The bulk of the material was imported from

India. In the hair and wool plants included in the control group, the most common sources of origin of raw materials were Argentina, United States, Chile, Uruguay, India and New Zealand; Argentina being the chief source of supply.

Horsehair was formerly a common source of anthrax infection, but during the last ten years there has been no case in Philadelphia which has been traced directly to the use of horsehair.

Table IX indicates the distribution of anthrax in the hair and wool industry. The worsted yarn plants and the carpet yarn mills accounted for 25 cases of anthrax in this industry—the worsted yarn plants having had thirteen or 42 per cent. and the carpet yarn mills twelve or 39 per cent. of the cases. Three cases occurred in rug mills; two among waste handlers and one in an employee of a mattress factory where curled cattle tail hair was being used for mattress filling.

TABLE IX  
INCIDENCE OF ANTHRAX IN THE HAIR AND WOOL INDUSTRY IN PHILADELPHIA,  
ACCORDING TO TYPE OF PLANT.

Type of Plant	Number of Cases	Percentage
Worsted yarn -----	13	42.0
Carpet -----	12	39.6
Rug -----	3	9.7
Mattress -----	1	3.2
Waste -----	2	6.4
 Total -----	 31	 100.0

In the hair and wool industry a significant difference was observed in the amounts of goat hair and hair waste used by the anthrax plants as compared to the amounts used by the control plants. Approximately 25 per cent. of the material used in plants having anthrax consists of goat hair and hair waste. In the control group, only 4.9 per cent. of the raw material is goat hair. In actual number of pounds, the control plants handled approximately twice as much material as the anthrax plants.

The principal waste products in the hair and wool industry are dusts from the opener, picker and willowing machines, fly which accumulates on machines, floor wastes and the burlap covering of the bales. The dust produced during the opening operation is usually removed by means of an exhaust ventilation system and is sold to waste dealers who in turn sell it to New Jersey truck farmers for use as a fertilizer. The dirty oil-stained hair and wool is sometimes collected, scoured, and re-used or is sold to waste dealers who screen and bale it, and later sell it to the carpet yarn industry or to companies which manufacture railroad bearing packings. The burlap coverings of the bales are generally used for the transportation of the waste wool to the dealers. In a few plants the bale wrappings are burned.



Anthrax occurs not only among employees engaged in the preliminary operations in the warehouse, picker house or carding room, but also in such occupations as twisting, bobbin-winding, weaving and loom fixing. Fifteen of the cases in the hair and wool industry occurred among employees of the raw wool department such as the picker house, the scouring room and the carding room, while sixteen cases occurred among employees engaged in subsequent operations.

The anthrax lesion in thirteen or 42 per cent. of the cases in the hair and wool industry occurred on the forearm as compared with three or 15.8 per cent. of the cases in the hide and skin industry. In the hair and wool industry, in seven or 22.6 per cent. of the cases the lesion occurred on the head; in three or 9.6 per cent. on the neck; and in the remainder the lesion occurred on other parts of the body.

#### ACKNOWLEDGEMENTS

The Bureau of Industrial Hygiene wishes to acknowledge with thanks the cooperation of the Philadelphia City Department of Public Health in making available its records of anthrax cases and the management of the industrial plants investigated without whose assistance and cooperation this study could not have been made.

#### SUMMARY

A total of sixty-three cases of external anthrax, none of which were fatal, occurred in 32 industrial plants in the city of Philadelphia during the period January 1, 1931 to October 15, 1940, according to the records of the Philadelphia City Department of Public Health.

Ten cases of external anthrax were reported in Philadelphia from January 1, 1940 to October 15, 1940.

Thirty-one, or 49.2 per cent. of the cases occurred in seventeen plants in the hair and wool industry; nineteen or 30.2 per cent. in seven plants in the hide and skin industry; eight or 12.7 per cent. among five stevedoring and trucking establishments; and five or 7.8 per cent. in five miscellaneous industries.

None of the 32 plants which had reported cases of anthrax nor 26 plants used as controls had full-time plant physicians. Six, or 20 per cent. of the anthrax plants, and two or 7.7 per cent. of the control plants had part-time plant physicians.

Ten, or 34.5 per cent. of the anthrax plants, and eight or 30.8 per cent. of the control plants have physicians on call.

One plant in the anthrax group and two plants in the control group had full-time nursing service.

One plant in the anthrax group and one plant in the control group had full-time safety engineers. Three plants in the control group and one in the anthrax group had part-time safety engineers.

Welfare provisions in general except for the services of insurance company physicians were not available to longshoremen and truckers.

Medical services were available more frequently in plants in the hide and skin industry than in plants in the hair and wool industry.



Sanitary facilities (toilets, locker rooms, lunchrooms, washrooms) were found in similar numbers in the anthrax and control plants. These facilities were generally lacking among longshoremen and truckers.

Sanitary facilities were available more frequently in plants in the hide and skin industry than in plants in the hair and wool industry.

Anthrax warning placards were displayed in twelve, or 41.4 per cent. of the anthrax plants; and five or 19.2 per cent. of the control plants. Warning placards were not found in any trucking establishments and only infrequently on some of the piers.

The average elapsed time between the date the lesion was first observed by the employee and date of reporting was found to be 2.6 days in plants having plant physicians, as compared to an average of 4.2 days in plants not having plant physicians.

No cases of anthrax have been reported in the hide and skin industry since 1938 as compared to 15 cases in the hair and wool industry during the same period.

Ninety-eight and five-tenths per cent. of the material handled in the anthrax plants in the hide and skin industry during the period January 1, 1931, to October 15, 1940, has been goat skins imported from India, Mexico, Argentina, Nigeria, Brazil and the British West Indies while in the control plants goat skins comprised only a small part of the raw materials handled, the others being sheep, cattle and kip skins. The materials used in the control plants were of domestic or South American origin.

The principal source of raw materials in the hair and wool plants having anthrax was found to be India, with China, Egypt and South America supplying lesser amounts. The principal source of raw materials in the hair and wool plants in the control group was found to be Argentina with the United States, Chile, Uruguay, India, and New Zealand supplying lesser amounts.

Approximately 25 per cent. of the material used in the hair and wool plants having anthrax was found to be goat hair, as compared with only 4.9 per cent. in the hair and wool plants in the control group.

Anthrax in the hide and skin industry occurred usually among employees in the beamhouse and warehouse. Only one case occurred in subsequent operations.

Anthrax in the hair and wool industry occurred not only in the preliminary operations, but also in such occupations as twisting, bobbin-winding, weaving and loom fixing.

Of the sixty-three cases of external anthrax reported in Philadelphia during the period January 1, 1931, to October 15, 1940, nineteen, or 30.2 per cent. of the lesions occurred on the forearm; sixteen, or 25.4 per cent. were on the head; and eleven, or 17.4 per cent. on the neck. The remaining 17 occurred on other parts of the body.

Potentially anthrax-infected waste materials from the hair and wool plants in Philadelphia have been sold by waste dealers for use as a fertilizer on truck farms in an adjoining state.

Regulations of the United States Bureau of Animal Industry affecting potentially anthrax-infected material have been rescinded since February 1, 1940. One of the results of this change has been the discontinuance of the practice of the pre-chlorination of the effluent wastes from hide and skin plants in Philadelphia.

# **A TWENTY YEAR SURVEY OF ANTHRAX IN THE UNITED STATES**

(Sixth Report of the Committee on Anthrax

Industrial Hygiene Section—American Public Health Association)

By

**HENRY FIELD SMYTH, M. D., Dr. P. H.**

Professor of Industrial Hygiene, University of Pennsylvania  
Chairman of the Anthrax Committee

As Chairman of the Committee on Anthrax, I have been reporting on Anthrax incidence and fatality in this country since 1919. Until last year statistical reports on human anthrax in this country, and bibliographies of the literature on the general subject of human anthrax have been presented together. Last year, however, we reported on the literature only, for the years 1934-1937, the report and bibliography being mimeographed for free distribution by the Division of Industrial Hygiene of the U. S. Public Health Service.

The statistical reports have previously been presented at irregular intervals so that comparison of figures as presented is practically meaningless in trying to interpret shifts in incidence. In addition to this, more information has been made available to us subsequent to our reports, which has sometimes changed the picture considerably. For example, in the first 5½ year period, 1919-1924, only 15 states reported having anthrax in reply to questionnaires. Subsequent information added 10 states to this list. In some states additional cases have been added; in others occasional cases originally reported have diagnoses, or duplicate reporting which has been brought to light when details have been made available. We have, therefore, re-analyzed all of the data included in previous reports, revising it according to information now available, and regrouping it into three comparable five-year periods, covering the years 1919-1933, inclusive.

In addition to the above reanalysis, we are presenting for the first time, figures on the last five-year period, 1934-1938. We have done everything we could to make the present report as accurate as possible. Questionnaires were sent to each of the 55 state and territorial health officers, with 100 per cent. replies for the first time in the 20 years we have been making such investigations. Questionnaires requested information as to date of reported case, name and address of reporting physician, name and address of patient, occupation, infective material, source of material, location of lesion, treatment, and termination of case. Very few states were able to supply complete information, so that 285 letters, plus an additional 45 "repeats" were sent to local health officers, physicians, hospitals, employers, and even patients themselves, in an intensive effort to obtain complete information on each case. This required in some instances as many as four

letters per case. We received 187 replies to these letters. All information thus received, as well as material in reports previously made, was checked with records received by the U. S. Public Health Service which were kindly put at our disposal.

This procedure has brought to light a rather surprising laxness in reporting and recording in some areas, and a complete lack of uniformity in collection of statistics throughout the country. During the last five-year period, the U. S. Public Health Service had obtained records of 13 cases which were omitted in reports sent to us from state health departments, while we had collected records of some 115 cases not included among those reported to the U. S. Public Health Service. In several instances diagnoses have been changed without changing reports; health officers have reported by counties only, giving only numbers of cases with no details, and not infrequently checking the wrong column so that reported cases of anthrax may prove to be chicken-pox! In other states, deaths only were recorded, anthrax morbidity not being reportable, and in one of these states no details could be obtained as all death certificates are sent to the Secretary of State for "permanent" filing, and cannot be located unless the name of the deceased is known. One state could give no information beyond the number of cases in the state per year because there was no room for filing and reports were discarded as soon as they were numerically recorded! Another state must have employed somewhat the same method since it states that the only way in which further information could be obtained would be a separate inquiry to each of over 600 local health units, the only investigating which the state ever carries out being done at the request of a local unit. In another state a case was reported by the State Dairy Supervisor in connection with his report on animal anthrax, which was not known to the State Health Department, and another case in the same state was reported in a man who had died one month previously of syphilis! In several instances follow-up letters to physicians, local health officers or employers, concerning cases reported by the state, have brought information on additional cases not included in the state report. In one state 11 cases were reported by two physicians who have since died, in small communities. There is now no knowledge that these cases ever existed and the State Health Officer says that he never doubted that they were wrongly diagnosed and wasted no effort in investigation, yet the record was allowed to stand. Mississippi still regrets that it is not possible to be sure that all of her 38 cases for this period were in man. In the first period, 1919-1924, she reported 585 cases, but could not distinguish between human and animal cases! The 38 cases were reported by counties, but only three of these could be verified by county health officers, who had no knowledge of the others.

In one of our leading states the State Health Officer had very complete records to 1934, and then listed only date of reporting and name and address of patient, as he did not wish to duplicate the work of investigation carried out by the Department of Labor. Seven such cases were recorded for 1935 and 22 for 1936-1938, but a letter to the State Department of Labor brought only a list of 11 cases for which compensation was awarded, 1936-1938, the date of award and general occupation. Names or addresses of cases were not given, and since



compensation may be awarded a year or two after infection, there was no way in which this information could be checked against other cases or utilized in our report. The only source of information in these later years, therefore, was individual follow-ups of Health Department records, replies to which were much less complete than information previously obtained by the State Health Department. In another state the Health Department had only cases by counties, but attempted to secure more detailed information from compensation records of the Department of Labor. They were informed, however, that such records were kept only under the names of employers and employees, and no information was available as to disability. Another State Department of Health reported no cases during the last five-year period, but later verified a report of four cases with two deaths found in the reports of the U. S. Public Health Service. Another one of our leading states reported only 25 cases, all from one city. In a check-up with city records seven more cases were found. Another check-up with the State showed that these additional cases had been reported and also an additional 14 cases from other communities of the state. In this same state an earlier report from the State Department of Labor showed 20 cases with two deaths in the first six months of one year, while a bulletin issued by the Health Department stated that there had been only 6 cases during that period as compared with 14 for a similar period the previous year, and that all of the cases were from one city.

Only 25 states and territories furnished what might be considered satisfactory information, and of these, only 11 states and two territories supplied complete information promptly. (By "complete" information, I mean all information requested except location of lesion and treatment, which I do not necessarily expect the State Department of Health to have on file.) Five more states and three territories reported no cases promptly. Two states supplied complete information after receipt of a second letter, one state gave very complete information for the last three years but omitted that for the first two, and one state supplied promptly the names and addresses of cases and of reporting physician, which made complete follow-up possible, but did not have occupations or infective material recorded.

It is easy to see from the foregoing, therefore, that the figures contained in this report cannot be considered 100 per cent. accurate, but we feel that in one way or another we have been able to collect fairly reliable information. We are sure, however, that the figures we give are minimum rather than maximum, and that there are still many unrecorded cases in the country.

Three large master tables of the material in hand have been prepared. The first gives the distribution of all cases and deaths by states and by individual years for the past 20 years. The second table gives the distribution of cases and deaths by states and by source of infection for each of the four five-year periods. The third table gives the distribution of cases and deaths by states and by type of treatment for each of the four five-year periods. These tables are too large and detailed for inclusion in this report, but are available to those desiring

to pay the cost of photostating and mailing. The tables included in this report are condensed from these three tables.

Table I gives the distribution of cases and deaths by states for the total 20 year period and for each of the four five-year periods. It will be seen that the number of states from which anthrax has been reported has increased from 25 in the first period to 27 in the second, 35 in the third, and 37 states and 3 territories (the latter being included for the first time) in the fourth. Over the 20 year period, only four states have failed to report cases—Alabama, Idaho, Nevada, and South Carolina. In the last-mentioned state, however, morbidity from this disease is not reportable—only mortality.

TABLE I

DISTRIBUTION OF CASES AND DEATHS BY STATES AND TERRITORIES.

State	Total 1919-1938		1919-1923		1924-1928		1929-1933		1934-1938	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
United States	1,683	353	461	107	468	100	379	85	375	61
Arizona	4	0	0	0	0	0	2	0	2	0
Arkansas	21	9	0	0	6	4	11	5	4	0
California	106	18	48	9	18	5	23	2	17	2
Colorado	14	5	8	4	0	0	1	0	5	1
Connecticut	27	3	5	1	11	1	9	1	2	0
Delaware	47	9+	10	?	5	4	14	2	18	3
Florida	8	7	0	0	0	0	6	6	2	1
Georgia	6	3	0	0	0	0	4	2	2	1
Hawaii	4	0	0	0	0	0	0	0	4	0
Illinois	37	19	23	14	7	2	3	1	4	2
Indiana	12	12	2	2	6	6	2	2+	2	2
Iowa	4	1	0	0	0	0	0	0	4	1
Kansas	9	6	3	1	2	2	2	1	2	2
Kentucky	3	3	0	0	3	3	0	0	0	0
Louisiana	93	28	25	10	33	12	17	2	18	4
Maine	6	1	3	0	1	1	2	0	0	0
Maryland	2	1	1	1	0	0	1	0	0	0
Massachusetts	171	25	51	9	42	5	49	9	29	2
Michigan	10	6	0	0	0	0	7	6	3	0
Minnesota	15	7	10	5	2	1	2	1	1	0
Mississippi	90	10+	(585!)	0	50	7	2+	0	38	3
Missouri	53	6	41	1	8	3	3	1	1	1
Montana	12	1+	6	?	0	0	4	1	2	0
Nebraska	9	3	3	2	0	0	4	1	2	0
New Hampshire	5	2	3	0	2	2	0	0	0	0
New Jersey	122	10+	18	?	48	4	29	5	27	1
New Mexico	3	1	0	0	0	0	2	0	1	1
New York	219	41	61	22	65	8	58	8	35	3
North Carolina	6	2	1	0	2	2	1	0	2	0
North Dakota	2	0	0	0	6	0	0	0	2	0
Ohio	37	21	12	9	12	4	4	2	9	6
Oklahoma	2	0	0	0	0	0	0	0	2	0
Oregon	11	2	0	0	7	0	3	2	1	0
Panama	1	0	0	0	0	0	0	0	1	0
Pennsylvania	264	33	83	11	82	17	55	5	44	0
Puerto Rico	13	9	0	0	0	0	0	0	13	9
Rhode Island	2	0	0	0	1	0	1	0	0	0
South Dakota	25	2	0	0	0	0	10	0	15	2
Tennessee	15	?	0	0	12	?	3	?	0	0
Texas	154	31+	51	?	40	5	40	18	43	8
Utah	1	0	0	0	0	0	0	0	1	0
Vermont	4	2	0	0	1	0	1	0	2	2
Virginia	7	4	4	3	1	1	2	0	0	0
Washington	5	4	0	0	0	0	2	2	3	2
West Virginia	10	1	0	0	0	0	0	0	10	1
Wisconsin	11	5	9	3	1	1	0	0	1	1
Wyoming	1	0	0	0	0	0	0	0	1	0

States and territories reporting no cases: Alabama, Alaska, District of Columbia, Idaho, Nevada, Philippine Islands, South Carolina, Virgin Islands.

New Hampshire has reported no cases in the last 10 years, Maine and Rhode Island none in the last 9 years, Maryland and Tennessee none in the last 8 years, and Virginia and Kentucky none in the last 5 years, with the latter having made no previous report for 8 years before that, probably because of lack of cases. Washington and South Dakota reported their first cases in 1931, West Virginia in 1934, Wyoming and Oklahoma in 1935, Iowa and North Dakota in 1937, and Utah in 1938.

The states reporting the most anthrax in the 20 year period are Pennsylvania 264, New York 219, Massachusetts 171, Texas 154, New Jersey 122, California 106, and Louisiana 93. Mississippi should be in the same list, probably at or near the top, but their records do not distinguish between animal and human anthrax. These states have scarcely missed a year in which anthrax has not occurred. Of these, Pennsylvania, New York, Massachusetts and New Jersey are industrial states reporting mostly tannery and wool anthrax, while Texas, California, Louisiana and Mississippi report mostly agricultural anthrax.

TABLE II  
ANTHRAX FATALITY IN PER CENT. OF CASES.

	Total 1919-1938	1919-1923	1924-1928	1929-1933	1934-1938
Cases -----	1,683	461	468	379	375
Deaths -----	353	107	100	85	61
Fatality -----	21—	23+	20+	22+	16+

Table II shows the total number of cases and deaths in each period with the per cent. fatality. When we compare the last five-year period with previous periods some interesting facts are noted. Since 1928 there is a decrease in cases, there being almost 100 less in the fourth period than in the second. This is more apparent than real, however. Reference to the U. S. Department of Commerce figures for imports in skins and for employees in tanneries will show that with the industrial depression there has been a decrease in employees and also in imported skins and hides, with a greater use of packer-killed hides which are usually from Government-inspected anthrax-free animals. This decrease in cases is, therefore, to be expected, and it will be seen from Table III that it comes only in the industrial groups.

Fatality rates are still high for anthrax as a whole, though the rate of 22+ per cent. for the third period dropped to 16+ per cent. for the fourth. As will be seen from Table V, this drop was again due almost entirely to the industrial cases in organized industries where earlier diagnosis, more prompt treatment, and the extensive use of serum and arsenicals are employed.

Tables III, IV, V deal with the various sources of infection. While Table III gives the cases and deaths by source of infection, Table IV, which reduces these figures to percentages of cases in which source of infection was stated, gives us a clearer picture of the situation. Because the figures of deaths by industries were not available for



the first five-year period, we have included total figures for the last 15 years. It is interesting to note that if we consider only the deaths, we obtain a rather different picture of distribution from that obtained by a consideration of cases only. Because of the high fatality in agricultural, transportation, shaving brush, and other non-industrial cases, the percentages of deaths are higher than the percentages of cases, while the reverse is true of the industrial cases such as tannery and

TABLE III  
CASES AND DEATHS BY SOURCE OF INSPECTION.

Period	1919-38		1924-38		1919-23		1924-28		1929-33		1934-38	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
Total	1,683	353	1,222	246	461	107	468	100	379	85	375	61
Source not stated	617	—	403	115	214	—	190	44	100	46	113	25
Source stated	1,066	—	819	131	247	—	278	56	279	39	262	36
Hides, skins	415	—	283	29	132	—	106	13	84	10	93	6
Wool	191	—	183	17	8	—	69	8	76	8	38	1
Hair, brushes	79	—	49	9	30	—	24	6	12	2	13	1
Transportation	26	—	26	7	0	—	7	1	10	4	9	2
Agricultural	233	—	201	46	32	—	39	16	73	11	89	19
Professional	20	—	20	1	0	—	6	1	8	0	6	—
Shaving brush	69	—	24	13	45	—	12	6	6	4	6	3
Other non-industrial	33	—	33	9	0	—	15	5	10	—	8	4

wool cases. From Table V we can see that if we eliminate those cases in which source of infection was not stated (probably not recognized or treated in many instances until too late) we have a very definite drop in fatality, and the groups in which this drop has been consistent have been the industrial groups.

Let us consider each of these groups separately. Cases of tannery anthrax, as we have stated above, have fluctuated with economic conditions, decreasing to the third period and then slightly increasing in the fourth.

Cattle hide tanneries have had very little anthrax during the depression period as most of them are packer-controlled and nearly all

TABLE IV  
PERCENTAGE DISTRIBUTION OF CASES AND DEATHS BY SOURCE OF INFECTION.

Period	Source Stated	Hides, Skins	Wool	Hair, Brushes	Transportation	Agricultural	Professional	Shaving Brush	Other Non-industrial
<b>Cases</b>									
1919-1938	100	38.9	17.9	7.4	2.4	21.9	1.9	6.4	3.1
1924-1938	100	34.6	22.3	6.0	3.2	24.6	2.4	2.9	4.0
<b>Deaths</b>									
1924-1938	100	22.1	13.0	6.9	5.3	35.0	0.7	10.0	7.0
<b>Cases</b>									
1919-1923	100	53.4	3.2	12.2	—	13.0	—	18.2	—
1924-1928	100	38.1	24.8	8.7	2.5	14.0	2.2	4.3	5.4
1929-1933	100	30.1	27.2	4.3	3.6	26.1	2.9	2.2	3.6
1934-1938	100	35.4	14.5	4.9	3.4	34.0	2.2	2.2	3.4



of their raw material comes from healthy cattle slaughtered for food under Government supervision. During prosperous periods, however, with greater demand for leathers, many hides collected by traders through the country or on the ranges, come to tanning, and with them comes anthrax, as I know from personal observation. These tanneries are smaller and more widely scattered, and less likely to be on the lookout for anthrax since they normally have few or no cases. Goat skin tanneries, however, always have an anthrax hazard. These skins are practically all imported from countries where anthrax is more or less prevalent, and are always likely to have anthrax infestation in some of the skins in spite of consular certification that the area from which they were shipped was free from anthrax at the time. I have personally isolated anthrax spores from various skins so certified. Goat skins in use at the time their handlers have developed anthrax have come from various countries in Asia, Africa, South America and Australia, as India, Indo-China, China, Mongolia, Arabia, Syria, Persia, East Indies, Egypt, Nigeria, South Africa and the Argentine. In Massachusetts anthrax was reported from skins disinfected in the lime soak recommended by the U. S. Bureau of Animal Industry but shown by us some years ago to be ineffective.

TABLE V  
PER CENT. FATALITY BY SOURCE OF INFECTION

Period	Source Stated	Hides, Skins	Wool	Hair, Brushes	Transportation	Agricultural	Professional	Shaving Brush	Other Non-industrial
Cases									
1924-1938 -----	16—	10+	9+	18	27—	23—	5	54+	27+
1924-1928 -----	20+	12+	11+	25	14+	41	16+	50	33+
1929-1933 -----	14	12—	10+	17—	40	15+	0	66+	0
1934-1938 -----	13+	6+	2.6	7+	22+	21	0	50	50

Although the drop in tannery anthrax cases may have been more apparent than real there has been a very real drop in fatalities in this group. In a study of tannery anthrax in Pennsylvania, 1910-1921, the fatality was 20 per cent. This has dropped to 12 per cent. in the second period, 12— per cent in the third, and 6+ per cent. in the fourth period. In this last period Pennsylvania with 16 and New Jersey with 17 tannery cases had no deaths; Massachusetts with 24 and New York with 17 had one death each, while Delaware with 17 cases had three deaths, these five states accounting for all but two of the tannery cases. This drop in fatality is undoubtedly due to earlier diagnosis and more prompt and efficient treatment. The goat-skin tanneries in which most, if not all, of these cases occurred, usually have their own plant physicians and trained foreman who are on the lookout for the slightest lesions. These plants are, for the most part, located in or near medical centers where adequate medical service can be obtained promptly.

Several cases have been reported as indirectly due to tanning as those of housewives caring for their tanner-husbands' clothing, a painter working in a tannery, and an insurance agent investigating a tannery claim.

In the last 10 years only two cases have been reported as due to finished leather, and neither of these were proved by isolating the organism from the leather. In one case finished leather was shipped to a wooden heel factory where one of the employees developed anthrax, and in the other anthrax developed after a glove finger stuck to a lesion made by treating a wart. I have always been skeptical of anthrax spores surviving the usual tanning processes, and as far as I know, none of the cases reported as due to finished leather have been proved by the isolation of the organism from the leather.

Wool anthrax showed a decided increase during the first three periods, being highest in the third period despite economic conditions which might have led us to expect a decrease in incidence as was the case with tannery anthrax. The reason for this increase will be seen in a quotation from our report to you in 1927, which stated that a marked increase in wool anthrax in this country "was predicted when Great Britain opened her disinfecting station in Liverpool (in 1921). All wool and hair that enters England from countries where anthrax is indigenous, must pass through this government station and be disinfected before it reaches the industrial plants. This is done at a fixed charge which is paid by the importer. It was predicted that this practice would result in diverting considerable wool coming from anthrax-infested regions, and likely to be infected itself, and that we would in this country receive a good deal more of this infected wool than we did previously. Apparently this is the condition, and is a strong argument for the establishment of our own disinfecting station for wool and hair."

Over 80 per cent. of our wool anthrax occurs in the states of New York and Pennsylvania, with the other cases scattered. In 1929 a report from one woolen mill stated that although they used only consular certified wool, all their cases had seemed to develop after the opening of the Syrian market. A report from another mill in 1930 stated that since the change of market from Egypt and Arabia to South America, their cases had ceased. It may be this change which has brought about the marked decrease in wool anthrax in the fourth period, although I have been able to secure no detailed figures on wool imports from various countries for this period.

One case was attributed to carrying finished rugs, although no organisms could be isolated from the rugs. Another was attributed to rags imported from Europe for use in paper-making. Various cases were attributed to scoured and so-called sterilized wool, the "sterilizing" process used being inadequate. The outbreak of seven cases with one death in a small primitive industrial village in Pennsylvania among wool-carpet-yarn-mill employees in the third period, was reported in our 1934 report.

The very decided drop in fatality in wool anthrax may be explained in the same way as that in tannery anthrax, being due to earlier diagnosis and more prompt and efficient treatment.

The numbers of anthrax cases and deaths in the hair and brush industries are hardly large enough to be interpreted, but the trend seems to be the same as with tannery anthrax, the numbers of cases decreasing and increasing with the fall and rise of economic conditions, and the fatality definitely decreasing.

Transportation, which includes longshoremen, truckers, etc., does not have enough cases for figures to be significant, but in every period the fatality has been higher than in the corresponding industrial groups. It is to be expected that such laborers would not seek treatment until late and that fatality would therefore be high.

The only other group with figures large enough to be significant is agricultural anthrax—that due to direct contact with sick animals or with manure, etc., from such animals. In this last period agricultural anthrax has been reported from two states, which have previously reported no anthrax—Iowa and North Dakota. Washington and South Dakota made their first reports eight years ago. In this last five-year period 26 states and 2 territories reported agricultural anthrax, while 9 others have so reported in former years. In this group there has been a steady increase in cases throughout the four periods, and the fatality has fluctuated being always higher than that for industrial anthrax in the corresponding periods. This is also to be expected because of the scattering of cases in areas where knowledge of the danger is not common and where skilled diagnosis and treatment is least available.

Many interesting cases have occurred in this group. In the third period, in California, a group of six cases resulted from one cow which seemed to fall dead just as a shot was heard. She was autopsied by her owner, his brother and a helper, who found no bullet hole, but a black spleen. The skin was allowed to dry in the open where thousands of flies fed. All three men developed anthrax as well as two small children in the neighborhood thought to have been infected through fly bites. (Several other infections have also been laid to fly bites, although in many instances they could have served merely as lesions into which the organism could have been introduced from the hands of the individual.) The sixth victim was the three-year-old child of the owner who slept with her father and was apparently inoculated directly from the father's pustule to the conjunctival sac. The father was treated by one physician who merely incised the arm, and the patient died. The others were treated by another who used serum and cautery and all recovered. The hide was not destroyed until after the second case sought treatment, several days after the first case.

A group of seven familial cases with two deaths, with a return of one of the cases the next year, in the third period was reported in our 1934 report. (We have also had a few other cases with recurrences, one man having been infected in three different years.)

Many cases were reported due to skinning or autopsying cows, shearing sheep, butchering, and milking. Other cases occurred in rendering plants, and from the use of fertilizers, the material in one instance being wool waste. Cases were reported from cattle feed, in one instance a blood meal; one case developed in a cordage factory from handling sisal fibres from Mexico, probably infected from animals. One girl in Louisiana apparently developed a fatal case while carving statuettes from horse bones. One man became infected



while caring for a dog that had fed on a dead sheep, another while caring for a sick mule.

One man thought he became infected from frog hunting, but being a Mississippi farmer, he was more likely infected from farm animals. Another man who had intestinal anthrax blamed it on eating a wild rabbit, but according to his physician he was a sheep herder and more likely infected from dust from sheep. Still another case of a dress clerk in an Ohio store was laid to bites from her pet cat, but the cat was not shown to be infected and no source seemed evident.

The newest animal transference was a case last year from Massachusetts of a man infected from skinning a dead mink in a minkery. The animals had become infected through being fed horse-meat from which the organism was later recovered. A similar case was reported this year from a western state where the minks were fed day-old calves.

To determine the correlation between animal anthrax in various states and what we have termed agricultural anthrax in man, we have endeavored to collect statistics from State Departments of Agriculture. These replies are not as yet all in, so that this phase will be handled in more detail in our report next year. Of those which have been received, the figures are much more variable than those for human anthrax as some states report by cases and others by herds, but at all events, thus far 24 states have reported animal anthrax more or less prevalent in the first period, 27 states in the second, in which period we had 11 states reporting agricultural anthrax in man, 29 states in the third period, with 20 states reporting in man, and 32 states in the fourth period with 26 states and 2 territories reporting in man. As a rule there is a definite lag between the outbreak of animal anthrax in a state and that of human agricultural anthrax in the same state. With prophylactic vaccination of animals being advised and practiced in 26 states it is hoped that eventually animal anthrax and the accompanying human agricultural anthrax will be at least very much reduced, although owing to the persistence of, and the persistent virulence of, the anthrax spores this will take a long time.

In the professional group we again have numbers too small to be significant but including only one death. It is to be expected that this group would be awake to its own danger and seek immediate and adequate treatment. In this group we find a medical student, a bacteriology teacher, several laboratory workers, and several veterinarians. One case developed in a veterinarian from an inoculation of attenuated spores apparently in an effort to immunize himself.

Shaving brush cases, formerly so prevalent at about the time of the World War, have been greatly reduced in number, but they still keep cropping up, and when they do, they have a fatality rate of from 50 per cent. to 66 per cent. Fatalities are high in shaving brush cases due to the highly vascular area affected, with its proximity to vital centers. The latest outbreak of shaving-brush cases is due to ship-



ments of cheap brushes made from "sterilized" horsehair imported from Japan, many of which have yielded spores on examination. This situation is being discussed more in detail, I believe, in a paper before the Epidemiology Section.

One case in California was presumably due to a tooth brush.

Another small group of cases developed among people whose occupation did not in any way bring them in contact with infective material and although their cases were bacteriologically confirmed, thorough investigations of all contacts failed to uncover the source. In two cases abdominal operative wounds became infected and in another the wound in a compound fracture of the hand was infected.

In 113 cases in the past five-year period, no source of infection was stated, these cases being reported largely from states in which records were very inadequate.

Table VI shows the location of the primary lesion in 640 cases in which the lesion was stated during the past 20 years. In eleven of these cases no external lesion was evident. In six of those cases in which there was a primary external lesion (including that in which the location of primary external lesion was not stated), secondary pulmonary or intestinal anthrax was reported. One very unusual case which was diagnosed only shortly before or after death was that of a man from whom an axillary gland mass had been removed six months previously and several physicians failed to make diagnosis until a positive anthrax smear was obtained.

TABLE VI  
LOCATION OF PRIMARY LESION IN 640 CASES

Total internal anthrax .....	11
Pulmonary .....	4
Pulmonary and intestinal .....	2
Intestinal .....	2
Meningeal .....	3
Total external anthrax .....	629
Face, head and neck .....	309
Upper extremity .....	264
Lower extremity .....	23
Chest, abdomen and back .....	23
Multiple lesions .....	9
Not stated .....	1

Table VI shows, as previously reported, a great preponderance of external lesions, the most exposed areas being most affected, with face, head and neck leading, upper extremity almost as often involved, and with comparatively few lesions on torso or lower extremity. Multiple lesions are infrequent, but do occasionally occur.

Table VII shows the distribution of cases and deaths and fatality by types of treatment during the past 15 years. Treatment was not reported in the first period. From this table it will be seen that

operative treatment of any kind is in the decline, and that decidedly better results are now obtained by the use of specific anti-anthrax serum. In recent years even better results appear to be obtained from the use of arsenicals either with or without serum. In one case having an external lesion of the ankle and a positive sputum and stool, serum and arsenicals were given in combination, and the patient recovered. Not a single fatality has as yet been reported with the use of arsenicals, but we do not feel that the use of serum should be discontinued until we have a much larger number of cases treated with arsenicals. Certainly one or the other of these methods should be used, possibly at present, both methods in combination.

In three instances patients were given sulfanilamide, in two instances with serum, and in one alone, and a fourth patient received serum and prontoslyn with excision and cautery of the lesion. None of these cases were fatal, but their numbers are too small to be significant.

TABLE VII  
DISTRIBUTION OF CASES AND DEATHS BY TYPE OF TREATMENT

Period	Cases		% Cases 1924-38	Fa- tality 1924-38	Cases					
	1924-38				1924-28		1929-33		1934-38	
	C.	D.			C.	D.	C.	D.	C.	D.
Total -----	1,222	246	—	20%	468	100	379	85	375	61
Treatment not stated ----	723	178	—	24+	381	87	194	58	148	33
Treatment stated -----	499	68	100	13+	87	13	185	27	227	28
Serum -----	312	30	62.5	9+	68	9	114	10	130	11
Arsenicals -----	27	—	5.4	0	—	—	5	—	22	—
Excision -----	28	6	5.6	28+	3	1	16	3	9	2
Incision -----	8	5	1.6	43—	—	—	3	1	3	2
Serum and arsenicals -----	27	—	5.4	0	8	—	4	—	23	—
Serum and excision -----	52	2	10.4	4—	8	—	25	1	19	1
Arsenicals and excision -----	1	—	0.2	0	—	—	—	—	1	—
Serum, arsenicals and ex- cision -----	4	—	0.8	—	—	—	2	—	2	—
Other -----	26	11	5.2	42+	4	1	11	6	11	4
None -----	14	14	2.8	100	1	1	5	5	8	8

The above report shows that there is still a decided need for prophylactic measures to be taken in the prevention of anthrax. If hides and skins, the largest single cause of anthrax cases, had been properly sterilized before reaching the tanneries, in the 20 years there would have been saved over 40 deaths and over 10,000 days' lost time, but as yet we have no accepted method for carrying out such sterilization. The author has for some time been endeavoring to get backing for a semi-commercial scale test of iodine disinfection which he feels sure would prove satisfactory on the basis of repeated laboratory experiments which have already been reported.

If wool and hair had been disinfected as is done satisfactorily in England, there would have been saved some 33 lives and over 5,000 lost days.

Agricultural anthrax which has been increasing to the point where it will soon take first place over tannery anthrax, can be satisfactorily

prevented only through the continued and increased activities of the U. S. Bureau of Animal Industry in insisting on proper disposal of carcasses of animals dying from anthrax and of State Departments of Agriculture in insisting on increasing use of prophylactic inoculations of herds whenever cases of animal anthrax occur, and of all herds in those areas where the disease is prevalent.

For the control of human anthrax we would also strongly advise all industries using potentially anthrax-infested materials to employ regular plant physicians trained in the early recognition of cases and in the treatment of the same. We emphasize the importance of prompt treatment of all skin wounds however trivial, and of promptness and thoroughness in whatever treatment is used, including the employment of absolute rest of the patient and of the affected part.

We wish to strongly urge our State Health Officers to make more thorough investigations of reported cases and to keep more accurate records, as a means of knowing and controlling the hazard in their states. Since no state has more than 20 cases in a given year it would surely not be too burdensome or expensive to thoroughly follow up each case. A suggested form for a complete record of each case is appended to this report.

With this 20 year study of human anthrax incidence in the United States, we feel that a study of animal anthrax in the same area would be of interest, as also, a survey of a world-wide anthrax. We already have reports from State Departments of Agriculture as previously stated, and with the assistance of the Pan American Sanitary Bureau and the League of Nations Health Organization we are assembling the world-wide figures. We have reports from over 20 countries on file, but have many yet to hear from, so these two studies will be reported upon at our next meeting as a supplement to this report.

---

### ANTHRAX CASE RECORD

STATE:	COUNTY:	LOCALITY:	
NAME:	AGE:	SEX:	COLOR:
ADDRESS AT ONSET:		NATIONALITY:	
ATTENDING PHYSICIAN (Name and address):			
HOSPITAL (Name and address):			
KNOWN OR SUSPECTED SOURCE OF INFECTION:			
KNOWN OR SUSPECTED METHOD OF INFECTION:			
WAS MATERIAL EXAMINED BACTERIOLOGICALLY? YES: NO:			
POSITIVE: NEGATIVE:			

---

## INDUSTRIAL:

OCCUPATION: DATE OF ENTERING WORK:  
NAME AND ADDRESS OF FIRM:  
NATURE OF MATERIALS HANDLED: (as hair, raw wool, sterilized wool,  
raw goat skins, finished leather, cattle hides, etc.):  
IMPORTED FROM WHAT COUNTRY OR COUNTRIES:  
HOW: WHEN:  
BY WHOM:  
ARRIVED ON WHAT SHIP: AT WHAT PORT:  
MARKINGS ON BALES:  
SANITARY PRECAUTIONS: PLANT MEDICAL SERVICE:  
ARE MATERIALS DISINFECTED: HOW:  
WHEN:  
WHAT OTHER MEASURES ARE TAKEN TO PROTECT THE WORKER:

---

## AGRICULTURAL:

NAME AND ADDRESS OF FARM, RANCH, FUR FARM, OR OTHER PLACE OF  
EMPLOYMENT:  
DUTIES: DATE OF EMPLOYMENT:  
ANIMALS TENDED (as sheep, cattle, horses, mink, etc.):  
WAS ANTHRAX RECOGNIZED AMONG ANIMALS TENDED:  
BACTERIOLOGICALLY PROVEN:  
WHAT ANIMAL FOOD WAS USED (as bone meal, hay, horse or cattle  
meat, etc.):  
ANIMAL FOOD OBTAINED FROM WHERE:  
WERE ANTHRAX ORGANISMS ISOLATED FROM THE FOOD:  
WHAT FERTILIZERS WERE USED (as bone meal, wool waste, manure,  
etc.)  
OBTAINED FROM WHERE:  
WERE ANTHRAX ORGANISMS ISOLATED FROM THE FERTILIZER:

---

## NON-OCCUPATIONAL:

SOURCE OF INFECTION (as shaving brush for male, husband's clothing  
for housewife, etc.):  
WAS BRUSH OR MATERIAL EXAMINED BACTERIOLOGICALLY:  
ORGANISMS ISOLATED:  
IF BRUSH, HOW LONG USED OR OWNED: . WHERE PURCHASED:  
WHERE MANUFACTURED:  
FURTHER REMARKS:

---



## HISTORY OF DISEASE:

DATE OF ONSET:

DATE OF FIRST MEDICAL TREATMENT:

FORM:

EXTERNAL:

LOCATION:

PNEUMONIC:

INTESTINAL:

MENINGEAL:

LABORATORY EXAMINATIONS:

YES:

NO:

SMEARS (mark + or —):

SPUTUM:

BLOOD CULTURES:

STOOL:

SPINAL FLUID:

ANIMAL INOCULATION:

TREATMENT:

SERUM:

EXCISION:

ARSENICALS:

PHENOL INJECTIONS:

OTHER (describe treatment given):

NONE:

REMARKS ON TREATMENT:

TERMINATION OF CASE: RECOVERED:

DATE:

DEATH:

DATE:

TIME LOST FROM WORK:

REMARKS: (Use back of sheet for additional space):

---

## APPENDIX TO

### "A TWENTY YEAR SURVEY OF ANTHRAX IN THE UNITED STATES"

Since this report was made, interest in anthrax as an occupational disease has been increasing, at least in our Eastern states. As I fully anticipated, anthrax, particularly in wool and hair industries, is increasing as a direct outcome of the European War, just as was the case in World War I.

I have recently had personal communications not only from our own City Health Department, but from the Industrial Hygiene Divisions of the Departments of Labor of New Jersey, New York and Massachusetts. New Jersey is especially concerned as to increase of wool anthrax; New York as to industrial anthrax in general; and Massachusetts as to tannery anthrax.

Because of the present war, even more "dead" wool and hair is now coming to this country without sterilization, and is being treated by industry by the method permitted by our Bureau of Animal Industry, which will usually be inadequate, due both to its short-comings and also to its improper performance. As previously stated, quarantine regulations governing this material, at best woefully inadequate, are likely to become very superficially observed or else neglected entirely

in world war times. It therefore appears that as long as war continues, and for some time thereafter, we may expect an increasing anthrax hazard in the eastern United States area.

England developed an altogether adequate method for disinfecting hair and wool, and invited the United States to cooperate in the establishment of jointly controlled disinfecting stations in export ports, so that no anthrax-infested materials would be shipped across the water, but Washington at the time felt that anthrax was not a widely enough distributed hazard to warrant the expense.

As yet there is no entirely satisfactory method of disinfecting skins and hides for anthrax. Our laboratory is therefore continuing experimental work on iodine disinfection (proved on laboratory scale to be reliable), in an endeavor to develop it as a satisfactory and economic industrial process. In this work we have the cooperation of a New Jersey tannery with a small-scale experimental tannery set-up, and of the Dow Chemical Co., the largest producer of iodine in this country. Last year the Sigma Xi honorary society made a small grant to aid in this work, and this year we have the promise of a much larger sum, if needed, from another source.

We are also much interested in the promise of arsenicals as curative agents, but we feel that before relegating serum to second or third place and putting neoarsphenamin first, experimental work should be carried out on large groups of infected animals, comparing the effects of serum, neoarsphenamin, and one of the sulfanilamide derivatives now proving effective in other bacterial infections. This work would call for the use of well over 300 animals, guinea pigs preferably, and would require an outlay of between \$500 and \$1,000. As yet we have been unable to secure the necessary funds for such a study.

# THE TREATMENT OF ANTHRAX

By

PASCAL F. LUCCHESI, M. D.,  
Superintendent and Medical Director  
Philadelphia Hospital for Contagious Diseases

and

NATHANIEL GILDERSLEEVE, M. D.,  
Chief Resident Physician  
Philadelphia Hospital for Contagious Diseases

Although the incidence and fatality of human anthrax has decreased in this country during the past ten years, it still remains one of the chief problems of certain industries. Dr. H. F. Smyth, prominent authority on this subject, believes the reduced incidence of anthrax to be apparent rather than real, since the last ten years have been depression years and consequently there has been a reduced number of employees in the industries which usually account for these cases. Then too, the information obtained from many states is still incomplete and inadequate. Indeed, the records of one of the states do not distinguish between animal and human anthrax.

The fatality rate for this disease is still high, being more than 16 per cent. for the five-year period of 1934-1938; although this was 6 per cent. less than the preceding five-year period. This decrease is due to the early diagnosis and better treatment given these patients in organized industrial clinics.

TABLE I  
LOCATION OF LESION

Face -----	12	Hand -----	3
Forearm -----	17	Axilla -----	1
Neck -----	10	Wrist -----	1
Chest -----	3	Back -----	1
		Total -----	48

In the early days of anthrax, the treatment was directed primarily at the destruction or the removal of the external lesion. This was accomplished by strong chemicals, cauterization and excision. It was soon realized, however, that attacking the lesion was not only ineffective, but harmful since it spread the infection to the surrounding tissues. In the absence of a better remedy, this was continued until 1876, when Koch discovered the anthrax bacillus as the causative agent. This opened a new avenue of approach, so that Pasteur successfully vaccinated animals against anthrax in 1880. This was followed by Marchoux's anti-anthrax serum in 1895. In 1903 Scalvo produced a serum which met with immediate and wide success. Sub-

sequently this serum was modified by many investigators both abroad and in this country. Needless to say the use of anti-anthrax serum reduced considerably the deaths from this disease. However, some physicians combined serum therapy with excision or cauterization in the hope that even better results could be obtained, but this was not the case. Unfortunately, this combined therapy is still being used in certain parts of this country at present.

Following the introduction of serum other biological and chemical products were discovered and used. Penna, et al (1) used normal beef serum with good results. Villegas-Ruiz (2) had similar experiences with the bacteriophage of D'Herelle. Pijper (3) obtained excellent results with neoarsphenamine alone. Eurich (4) has treated over 200 cases with combined serum and neoarsphenamine with a mortality rate of 5 per cent. Meschtschaninoff (5) treated 21 patients with neoarsphenamine, all patients recovering.

TABLE II  
OCCUPATION

Leather industry -----	16
Wool industry -----	17
Hair -----	5
Miscellaneous:	
Stevedore, handling rawhides -----	4
Brush peddler -----	1
Hardware store proprietor (brushes?) -----	1
Carpet weaver -----	2
Truck driver, handling rawhides -----	1
Housewife (husband in wholesale hide business) -----	1
Total -----	48

It seems to us that the ideal treatment for anthrax should be one which, 1, does not harm the patient; 2, produces the lowest mortality rate; 3, causes the shortest absence from employment; 4, is the least expensive; 5, is easily given. There are several products used today which fulfill these ideals most completely. They are: 1, anti-anthrax serum; 2, neoarsphenamine and 3, serum plus neoarsphenamine. A few patients have been treated with sulfanilamide, but not in sufficient number to allow adequate appraisal.

In 1932 one of us (P.F.L. (6) ), reported the treatment of 19 cases of anthrax with serum without a fatality. At that time several patients had been given neoarsphenamine with good results, but the number was too small to speak about. Since then an additional group of 48 patients has been treated at the Philadelphia Hospital for Contagious Diseases. Nineteen received serum; 15 serum and neoarsphenamine; 10 neoarsphenamine; 3 sulfanilamide; and one received sulfanilamide, neoarsphenamine and serum. All of the patients had the cutaneous form of anthrax; and all but one had negative blood cultures for anthrax bacillus. The lesions were found primarily on the face and neck; secondarily on the forearms. Other parts of the body



involved were the chest, hands, wrist, axilla and back. (Table I). Thirty-eight of the patients were employed in the wool, leather and hair industry. (Table II). The average age of the group was 40.8 years; the youngest being 19 years, the oldest 78 years (Table III).

TABLE III  
AGE INCIDENCE

Average age -----	40.8 years
Youngest age -----	19.0 years
Oldest age -----	78.0 years

Upon admission to the hospital the patient was seen by a member of the resident staff and treatment prescribed. If the patient's general condition was poor; if the lesion had been manipulated; if internal anthrax was suspected; or if the lesion was on the face; serum was given, otherwise the patient received neoarsphenamine alone or in combination with serum, or sulfanilamide.

The initial dose of serum was 100-150 cc. intravenously repeat in twenty-four, forty-eight and seventy-two hours as the case warranted. Injection of serum about the lesion has been discontinued since 1932 at the Philadelphia Hospital for Contagious Diseases. Nineteen of the patients received an average of 358 cc. of serum averaging 2.3 injections. The smallest dose was 100 cc., the largest 1200 cc. (given a patient whose blood showed the presence of anthrax bacillus).

The average number of days of disease upon admission was 5; the average number of days confined to the hospital 14.7. This was 3.7 and 2.6 days more than the neoarsphenamine and serum and neoarsphenamine groups respectively (Table IV).

The initial dose of neoarsphenamine was .6 gms., .9 gms. being given the next day and this repeated in twenty-four hours if necessary. In a few cases .45 gms. was given as the initial dose. This was followed

TABLE IV  
TYPE OF TREATMENT

	Serum	Serum and Neo- arsphena- mine	Neo- arsphena- mine	Sulfanila- mide
Total number receiving -----	19	15	10	3
Average amount -----	358 cc.	200 cc.	1.4 gm.	2.25 gm.
Smallest amount -----	100 cc.	100 cc.	0.3 gm.	1.35 gm.
Largest amount -----	1,200 cc.	450 cc.	2.6 gm.	3.00 gm.
Average number of injections -----	2.3	2	3	
Smallest number of injections -----	1	1	2	
Largest number of injections -----	6	3	4	
Average day on admission -----	5.0	5.1	3.0	6.6
Average hospital days -----	14.7	12.1	11.0	13.6
Shortest hospital days -----	8.0	7.0	8.0	3.0
Longest hospital days -----	46.0	18.0	14.0	24.0

at twenty-four hour intervals by .6 gms. and .9 gms. The average amount of neoarsphenamine given the 10 patients in this group was 2.25 gms. No untoward or toxic reactions were experienced by any of the patients. The lesions dried quicker as could be noted by black eschar. Chilly and achey sensations noted following the injection of serum were absent in this group.

The average day of disease upon admission to the hospital was three or two days less than either the serum or serum and neoarsphenamine groups. Fifteen of the patients received serum and neoarsphenamine. The combined dose of these agents was smaller than for either of the serum or neoarsphenamine groups. The average dose of serum was 200 cc. and of neoarsphenamine 1.4 gms., in contrast to an average of 358 cc. and 2.25 gms. for the serum and neoarsphenamine groups respectively.

Sulfanilamide was given to three patients. Two of these patients had been given the drug before admission for periods of one and four days with total doses of 60 grains and 250 grains respectively. In both it was necessary to use serum after admission. The third patient presented a well localized, small lesion and it was decided to treat him with sulfanilamide alone. His course is briefly summarized below.

L. K. a 20 year old textile worker was admitted to the hospital with a typical anthrax lesion of four days duration on his right forearm. Both smear and culture of the lesion showed anthrax bacilli, blood culture being negative. Treatment consisted of sulfanilamide alone in dosage of 30 grains initially followed by 15 grains every four hours. On the fourth day of administration, nausea, abdominal pain, vomiting and fever occurred. The possibility of gastro-intestinal anthrax was feared, but to our relief stool cultures proved negative, and all symptoms disappeared after sulfanilamide was discontinued. The lesion involuted very slowly, however, and he was confined to the hospital for 24 days and cultures of the lesion remained positive until the twentieth day of hospitalization, an unusually long time in our experience.

While the number of patients treated is too small for conclusions we have a definite clinical impression that these patients did not fare as well as the others and complained of more discomfort which only disappeared after the drug was discontinued.

One patient had an incision of the lesion and 60 grains of sulfanilamide before admission. This patient was quite ill on admission and was therefore given serum. He developed a severe serum disease several hours after the injection, as a result he was given neoarsphenamine instead of more serum.

## DISCUSSION

The forty-eight patients reported in this paper together with the 19 previously reported by one of us, makes a total of 67 patients treated without a fatality, although two patients had a blood stream infection. This fortunate experience we attribute to the rigid "hands off" policy to which we strictly adhere. We feel certain that some of these patients will get well without treatment if the lesion be left alone. Of

the treatment employed in this study we definitely favor the neoarsphenamine because it best fits the ideals for treatment which we enumerated above. However, if the patient is afflicted with the internal type of anthrax, if the blood stream has been invaded, or if the lesion is on the face or neck, serum is the agent of advice. If there is any doubt as to the type of treatment desired, give serum.

### CONCLUSIONS

1. 48 patients with human anthrax were treated as follows:
  - a. 19 with serum
  - b. 10 neoarsphenamine
  - c. serum and neoarsphenamine
  - d. sulfanilamide
  - e. 1 sulfanilamide, serum and neoarsphenamine
2. Neoarsphenamine gave the best results in selected cases.
3. The dictum "hands off the local lesion" should be strictly adhered to.

### BIBLIOGRAPHY

- (1) Penna, Jose: Prensa Med. Argentina, Buenos Aires 4:91, 1917-1918.
- (2) Villegas-Ruiz, J. De: Caceta Medica De Caracas 23:324, 1926.
- (3) Pijper, Adrianus: Lancet 210:88, 1926.
- (4) Eurich, F. W.: Brit. M. J. 21:50, 1933.
- (5) Meshtchaninoff: Cited by Gax "Agents of Disease and Host Resistance," Baltimore, Charles C. Thomas, 1935.
- (6) Lucchesi, Pascal F.: Am. J. M. Sc. 183: 795, 1932.

# ANTHRAX IN THE FUR-FELT HAT INDUSTRY

By

IVOR GRIFFITH, Ph.M., Sc.D., F.R.S.

Research Director, John B. Stetson Company.

One of the briefest presentations in the history of scientific meetings might have been consummated had the author of this paper risen to his feet and said "There is no anthrax in the fur-felt hat industry," and then promptly precipitated into his cubicle. But scientific papers, though negative in essence, must clothe their modicum of truth in a mantle trimmed with trivia.

Fur for the fur-felt hat industry (which is distinct from the wool hat felt industry in that it does NOT use wool in any form) is secured from the small mammals, chiefly the coney or rabbit, the hare, beaver, nutria and muskrat, the latter three being water animals. The large hatters and the so-called fur cutters who prepare fur for the smaller hatting concerns receive their raw pelts from such divergent sources as Australia, South America, Alaska, the British Isles, Siberia, Continental Europe and elsewhere. One large hat manufacturing company uses over ten million pelts annually. These pelts variously come from centers of collection, the collection being from hunters, trappers, poachers, junk dealers, etc. Usually they are center slitted through the belly and given a half-hearted cleaning, then sorted and sent out. A personal visit to European collecting centers gave no indication that these skins were in any sense disinfected. Shortly after their arrival at the so-called cutting establishment, they may or may not have a cyanide fumigation, all depending upon their insect infestation. However, not more than 10 per cent. of received pelts require this protective measure. They are treated on the fur side with chemical solutions of various types, chiefly the acid nitrate of mercury, and then dried in the air or at temperatures varying from 160-180° F. to secure specific felting properties. The next process separates the pelt, in shreds from the fur, which is bagged and stored, and the pelt shreds disposed of to glue makers.

Thus in the fur felt industry, prior to chemicalization and heat treatment of the fur, only the unpackers, sorters, brushers and carroters are exposed to whatever hazard which may be present in the raw pelt.

Hospital records over nearly half a century, and statistics of our own city, herewith appended, do not reveal a single case of anthrax in this industry.



It is interesting to speculate just why this condition exists since the prevalence of anthrax in the soil suggests that these little animals might easily harbor this resistant and gargantuan bacillus. But small mammals of this order are not carnivorous and therefore are not infectable and infecting through eating the flesh of contaminated carrion. It is also a fact that when such animals (rabbit and coney) are laboratory inoculated with anthrax they succumb almost at once. This leads us to believe that they must be natively resistant else their species might have been long since extinguished by this prevalent organism.

In any event, nowhere do we find a record of anthrax in connection with the handling of the skin or fur of the small mammals. Nor, strangely enough, have we known of a single recorded case of rabbit fever (tularemia).

Appended are several tables which have come to me through the courtesy of Dr. Ruth Weaver, Chief of the Department of Vital Statistics of the City of Philadelphia.

## PHILADELPHIA DEPARTMENT OF HEALTH

### ANTHRAX MORBIDITY AND MORTALITY IN PHILADELPHIA 1904-1940.

Year	Cases	Deaths	Year	Cases	Deaths
1904-----	0	0	1924-----	7	0
1905-----	7	0	1925-----	14	1
1906-----	9	0	1926-----	15	2
1907-----	15	0	1927-----	8	2
1908-----	4	0	1928-----	16	5
1909-----	9	0	1929-----	14	0
1910-----	8	2	1930-----	7	0
1911-----	2	1	1931-----	6	0
1912-----	10	3	1932-----	2*	0
1913-----	9	3	1933-----	2	0
1914-----	9	4	1934-----	4	0
1915-----	5	1	1935-----	12	0
1916-----	7	5	1936-----	8	0
1917-----	10	3	1937-----	4	0
1918-----	8	1	1938-----	2	0
1919-----	10	4	1939-----	10	0
1920-----	15	2	1940-----	10	0
1921-----	10	1			
1922-----	22	2			
1923-----	22	1			
			Total -----	332	43

\* Statistical records available from 1932 to date.

NO DEATHS SINCE 1928.

# STATISTICAL ANALYSIS OF ANTHRAX CASES FROM 1932 TO NOV. 9, 1940

## SOURCE OF INFECTION

Leather industry -----	Workers -----	15	
(Hides, skins, etc.) -----	Truckers -----	1	
	Stevedores -----	1	
			17
Wool industry -----	Workers -----	22	
(Yarn, rugs, etc.) -----	Truckers -----	2	
	Stevedores -----	3	
	Watchmen -----	1	
	Office employee -----	1	
			29
Hair and brush industries -----	Workers -----	4	
(Haircloth, etc.) -----	Stevedores -----	1	
			5
Miscellaneous -----	Broom maker -----	1	
	Hardware store owner ---	1	
	Wife of hide dealer -----	1	
	(Housework) -----		3
			54
Total cases from 1932 to date -----			54

## LOCATION OF LESIONS

Limbs -----		
Wrist -----	2	
Hand -----	3	
Arm -----	3	
Forearm -----	18	
Thigh -----	0	
		26
Trunk—chest -----	4	
Face -----	13	
Neck -----	10	
Head -----	1	
		28
Total -----		54

## MULTIPLE CASES

Leather industries -----	12 cases
Wool industries -----	15 cases
Confirmed by labora-	
tory -----	46
Clinical cases only ---	8
Total -----	54

SEX		COLOR	
Male	Female	White	Black
45	0	53	1

1932	
Case 1	Goat hair—China, India.
Case 2	Goat hides—Argentine, Africa.
1933	
Case 1	Wool—Buenos Aires. Goat hair—India, Africa.
Case 2	Goat hair—India. Wool—Domestic.
1934	
Case 1	Goat skins—Africa, China, India, Egypt, Java, Chile.
Case 2	Goat skins—Argentine, Africa, India, China, Brazil.
Case 3	Goat hair—China, India, South America.
Case 4	Goat skins—Africa, India, Java, Arabia.
1935	
Case 1	Goat skins—India, China, Turkey, Africa, Mexico.
Case 2	Goat skins—Mexico, Peru, Africa, China, India.
Case 3	Goat skins—China, South America, India, Africa, Mexico.
Case 4	Goat skins—Africa, Brazil, Mexico, China, Argentine.
Case 5	Wool—China, South America.
Case 6	Goat skins—India, Venezuela, Peru, Domestic.
Case 7	Wool—China, India, Iceland, South America.
Case 8	Burlap bags, seeds—Turkey.
Case 9	Goat skins—Turkey.
Case 10	Wool—China, Egypt, South America, Scotland, Arabia, India.
Case 11	Wool—Scotland, China, South America, Egypt, Thibet, India.
Case 12	Broom salesman—No source available.
1936	
Case 1	Wool—South America.
Case 2	Goat hides—India.
Case 3	Goat hides—Brazil, Argentine, China.
Case 4	Wife of hide dealer. Shipment of leopard skins, source unknown.
Case 5	Wool—Source unidentified.
Case 6	Wool—South America, Tunisia, India.
Case 7	Goat skins—India.
Case 8	Goat skins—Africa, India.
Case 9	Goat skins—Java, Africa, India, Domestic.
1937	
Case 1	Wool—China, Thibet, South America, India, China.
Case 2	Goat hair—India, Tunis.
Case 3	Goat skins—Brazil.
Case 4	Goat skins—Brazil, Argentine, India, Algeria.
1938	
Case 1	Goat skins—Africa. Sheep skins—Africa.
Case 2	Goat hair—India.
1939	
Case 1	Goat skins—South America.
Case 2	Wool rugs—Shipped in United States, source of material unknown.
Case 3	Goat hides—India.
Case 4	Wool—South America. Horse hair—China. Goat hair—India.
Case 5	Haircloth—No source available.
Case 6	Goat hides—Africa.
Case 7	Wool—Plant closed. Man cleaning yard.
Case 8	Wool—Argentine, Scotland, Egypt.
Case 9	Wool—China, Russia, Turkey, South America.
Case 10	Wool—India, South America, England.
1940	
Case 1	Wool—Persia, India, Egypt, Scotland.
Case 2	Wool—China, Scotland, Egypt.
Case 3	Wool—Egypt.
Case 4	Hardware store owner—Source not available.
Case 5	Goat hair—Domestic.
Case 6	Goat hair—Domestic. Wool—Domestic.
Case 7	Wool waste—Collected from all factories.
Case 8	Wool waste—Collected from all factories.
Case 9	Goat hair—India.
Case 10	Goat hair—China.

**GOAT HAIR—IMPORTS.**

Countries	1932	1933	1934	1935	1936	1937	1938	1939	1940	Total
China -----	1	0	1	0	0	0	0	0	1	3
India -----	1	2	1	0	0	0	0	1	1	6
Africa -----	0	1	0	0	0	0	0	0	0	1
South America -----	0	0	1	0	0	0	0	0	0	1
Tunisia -----	0	0	0	0	0	0	1	0	0	1
Domestic -----	0	1	0	0	0	0	0	2	2	5

**HORSE HAIR—IMPORTS.**

Countries	1932	1933	1934	1935	1936	1937	1938	1939	1940	Total
China -----	0	0	0	0	0	0	0	1	0	1

**WOOL—IMPORTS**

Countries	1932	1933	1934	1935	1936	1937	1938	1939	1940	Total
South America -----	0	1	0	4	2	1	0	3	0	11
China -----	0	0	0	4	0	2	0	1	1	8
India -----	0	0	0	3	1	1	0	1	1	7
Iceland -----	0	0	0	1	0	0	0	0	0	1
Egypt -----	0	0	0	2	0	0	0	1	2	6
Scotland -----	0	0	0	2	0	0	0	1	2	5
Arabia -----	0	0	0	1	0	0	0	0	0	1
Thibet -----	0	0	0	1	0	1	0	0	0	2
Tunisia -----	0	0	0	0	1	0	0	0	0	1
Persia -----	0	0	0	0	0	0	0	0	1	1
England -----	0	0	0	0	0	0	0	1	0	1
Russia -----	0	0	0	0	0	0	0	1	0	1
Turkey -----	0	0	0	0	0	0	0	1	0	1
Argentina -----	0	0	0	0	0	0	0	1	0	1
Domestic -----	0	0	0	0	0	0	0	0	1	1
Wool waste -----	0	0	0	0	0	0	0	0	2	2
Not available -----	0	0	0	0	1	0	0	2	0	3

**GOAT—HIDES**

Countries	1932	1933	1934	1935	1936	1937	1938	1939	1940	Total
Argentina -----	1	0	1	1	1	1	0	0	0	5
Africa -----	1	0	3	4	2	0	1	1	0	12
China -----	0	0	2	3	1	0	0	0	0	6
India -----	0	0	3	4	3	1	0	1	0	12
Egypt -----	0	0	1	0	0	0	0	0	0	1
Java -----	0	0	2	0	1	0	0	0	0	3
Algeria -----	0	0	0	0	0	1	0	0	0	1
Brazil -----	0	0	1	1	1	2	0	0	0	5
Chile -----	0	0	1	0	0	0	0	0	0	1
Arabia -----	0	0	1	0	0	0	0	0	0	1
Turkey -----	0	0	0	2	0	0	0	0	0	2
Mexico -----	0	0	0	4	0	0	0	0	0	4
South America -----	0	0	0	2	0	0	0	1	0	3
Peru -----	0	0	0	2	0	0	0	0	0	2
Venezuela -----	0	0	0	1	0	0	0	0	0	1
Domestic -----	0	0	0	1	1	0	0	0	0	2



# THE ENFORCEMENT PROBLEM

By

HARRY D. IMMEL, Director,

Bureau of Inspection,

Pennsylvania Department of Labor and Industry

Twenty years ago—in other words soon after state factory inspection became standardized in Pennsylvania—there was a focus of attention on anthrax in this state which led to a survey undertaken by Doctor Elizabeth Brieker, then Medical Inspector for the Pennsylvania Department of Labor and Industry, in cooperation with Doctor Henry Field Smyth, Assistant Professor of Industrial Hygiene of the University of Pennsylvania. Out of that survey came a report, published in 1922, summarizing 123 cases of anthrax as having occurred in the tanning industry in Pennsylvania in the period from 1910 to 1921, and from it were developed certain recommendations which the Bureau of Inspection has since that time more or less consistently applied.

As far as actual law or regulation is concerned, dealing specifically with exposure to anthrax in Pennsylvania industry, our Department has in effect just one regulation. This is a rule adopted by the Industrial Board of the Department under date of June 24, 1921, which offers a choice of three methods of treatment of horse hair to attain its sterilization. As to anything further, our efforts at enforcement have been mainly the application of sanitation regulations applied under the State's General Safety Law, including ventilation and the installation of washing and dressing facilities.

As far back as that survey of twenty years ago it was recognized that the most effective method of anthrax prevention would be some central system of effective sterilization and disinfection of hairs and hides before their use in industry. This method having been discarded as impracticable, though even then successfully applied in England, these materials continue to be used largely without treatment, and protection of the workers is left to such unsatisfactory control as can be applied through individual plant inspection.

Our method of procedure follows this routine: Cases of anthrax developing in industry are reported on a standard form under a law which requires that such report be made within 15 days after the date of any industrial injury not involving death. Prior to the enactment of the State's Occupational Disease Law of 1938, anthrax infection was classified as an "accident." Incidentally, anthrax reporting appears, from the increased number of cases reported, to be more carefully observed since the Occupational Disease Law was passed.

On receipt of a report of anthrax infection our Bureau inspects the premises to ascertain what steps can be taken to reduce the exposure. On the several occasions in past years when prevalence of anthrax indicated the introduction of stock badly contaminated there was a checkup of all tanneries and factories where exposure existed.

Quite frankly, the great problem of a bureau of factory inspection is the distribution of its services in such manner that workers and employers may receive the most general benefit. The field force of our Bureau of Inspection averages one inspector for each of the 67 counties in the state. With the tendency of the Legislature to add constantly to the scope of duties performed by the Bureau of Inspection, the amount of time which an inspector can devote to routine visits to places of employment becomes more and more limited.

I have no desire to minimize the importance of anthrax control. The survey made in 1921 revealed 26 fatalities among 123 cases, or a mortality rate of 21 per cent. From 1936 down to date we have a record of 38 cases of anthrax infection reported in Pennsylvania industry, of which 12 were reported in the first 9 months of 1940. Our records do not show a fatality to have resulted from any one of these 38 cases, although I cannot say that a follow-up of all of them, and of others unreported, would not have revealed some fatalities. The fact remains that this is an extremely small number of cases when viewed in contrast with the total of all injuries, fatal and non-fatal, sustained by Pennsylvania workers in the course of a year. For example, in 1939 a total of all reportable injuries to workers in Pennsylvania was 103,607, the total fatalities of which were 1,204. For the manufacturing industry alone, which includes tanneries and other factories working with hair and hides, the total of all injuries was 35,246, and of fatalities 250. There are close to 20,000 industrial establishments in Pennsylvania, while the total of all places over which our Bureau must exercise some degree of jurisdiction probably runs well beyond 100,000. There were in 1939 just 9 cases of anthrax infection reported.

The public is prone to over-emphasize the importance of anthrax exposure from our point of view. This is occasioned by the extent of publicity which any anthrax outbreak receives, because anthrax is to public and press something rather strange and unusual. A good example of accident over-emphasis was the attention concentrated on several spectacular tunnel fatalities in construction of the new Pennsylvania Turnpike recently completed. As regrettable as is any injury, especially a fatality, the fact is that our record of tunnel accidents on the Turnpike was considerably below the best National average for accident frequency in building hard rock tunnels. Meanwhile, receiving no attention at all from press or public, protruding nails in timber scattered heedlessly about in the haste of the operation were striking everywhere like deadly cobras, causing puncture infections which were giving those of us charged with accident control constant concern and causing an impressive amount of loss of workers' time and danger to life. It is all a matter of perspective.

However, anthrax does quite definitely exist as an industrial hazard in Pennsylvania, it is susceptible of control, and it is our job to do everything possible to control it. I only wish to emphasize the limitations of a factory inspection service in applying mechanical control. As a firm believer in, and practitioner of education as the only solid foundation for any enforcement of industrial safety, I regard this symposium as a definite step in the right direction. It also can be a valuable guide to our furtherance of control.

It will perhaps interest you to know of the precautions the Bureau of Inspection has taken with regard to use of animal products in bedding and upholstery. Our Division of Bedding and Upholstery requires that all such materials coming into factories where these articles are manufactured shall have been thoroughly sterilized. Permits are issued to concerns furnishing the products, such issuance being based on a guarantee that only thoroughly sterilized materials will be sold by them. A tag, which must appear on manufactured articles of bedding and upholstery sold in Pennsylvania, is a guarantee to the public that the contents have been sterilized.

Reviewing briefly, in conclusion, the practice of our inspection service with respect to anthrax exposure outside the bedding and upholstery industry, we undertake to periodically visit all establishments and to immediately inspect those from which anthrax cases have been reported. We require mechanical ventilation where it is indicated that exhaust systems may assist the removal of injurious dust. We ask that suitable wash and dressing rooms, with lockers and water of proper temperature, be provided. To persuade workers to use these facilities is a matter of education.

We try to have them keep their working clothing at the factory so that there is less probability of the anthrax germ being carried home. We impress the need of prompt detection and treatment of symptoms of anthrax. In this connection we issue a card picturing the appearance of anthrax sores at several stages. Accompanying this card is another in 5 languages, urging the worker to become familiar with the appearance of an anthrax sore, and to consult his foreman or physician about any sore which may develop.

I previously referred to an Industrial Board regulation adopted in 1921 for treatment of horse hair. This rule provides three alternatives: namely, subjection of the material to dry heat at a temperature of 200 degrees F. for 24 hours, subjection to steam at 15 pounds pressure for a period of 2 hours, or boiling with the hair constantly covered with boiling water for 3 hours. I must confess that this regulation has not been applied. In the first place it takes into consideration only horse hair which, from our Pennsylvania records, is not a general source of the infection. The equipment necessary for this sterilization would be quite expensive and should there be failure to carry out the instructions exactly, the worker would get merely a false sense of security.

Finally, the same thing is true of anthrax that is true of every other hazard to which the industrial worker is exposed. I don't care whether it is an unguarded rip saw or a mushroomed hammer. No factory inspection can function satisfactorily as a police force. It is a service organization or nothing. Pennsylvania is second only to New York among all the states in its number of factory inspectors. Yet Pennsylvania would have to have a larger force of inspectors than we could conceivably afford if we were to exercise that close surveillance over every establishment which would enable us to get satisfactory results by enforcement alone.

Fortunately, there is a far better method right within our reach. That method is education. Usually the employer is easily convinced of the economic value of safety and good health in his shop and will cooperate. As for the American industrial worker, first tell him why, then show him how, and you shall have gone a long way toward enlisting his active aid.



## DISCUSSION

By

O. F. HEDLEY, M.D.,

Division of Industrial Hygiene  
National Institute of Health

It is indeed infrequent to have the opportunity of listening to a group of papers which deal with a single subject from so many points of view. The problem of anthrax has been covered so thoroughly and in such an interesting manner that I feel that lengthy discussion is quite superfluous. At the risk of appearing somewhat repetitious, I wish to emphasize certain features and to present them from a somewhat different point of view.

Colonel Hitchens has shown that although the bacillus of anthrax was the first pathogenic bacterium to be discovered, it has proved a worthy foe. Even after nearly three quarters of a century following its discovery it is still refractory to methods of disinfection adaptable to industry. Although brilliant results have been obtained by artificial immunization in veterinary medicine attempts to produce artificial immunization in man have not been attended with a like measure of success.

No method of disinfection has a commercial application unless it is inexpensive, simple to operate, thorough, not injurious to the finished product, and not an industrial hazard in itself. So far as wool and hair are concerned such a method has been evolved at the Central Disinfecting Station in Liverpool, England. Contrary to a prevailing impression, the British Government does not disinfect skins and hides. The Liverpool Disinfecting Station is limited only to wool, hair and bristles. No government has ever established a national disinfecting station for skins and hides at a port of entry. Discussing this point the International Labor Office states "There are undoubted advantages attaching to disinfection in special establishments. On the other hand, this is apt to be very expensive and an enormous hindrance to legitimate commerce, as is obvious. However great the advantages in special establishments may be from the sanitary point of view they are counterbalanced by its economic disadvantages as compared with disinfection in the tannery itself."

The International Labor Office also indicates that few governments have adopted legislation requiring compulsory disinfection at the tanneries. The reason for this is that no satisfactory method has been devised for disinfecting hides and skins. Until such a method has been discovered it is manifestly not the course of wisdom to burden industry with ineffective measures.

Even though a satisfactory method for the disinfecting of skins were made readily available the establishment of government stations would not provide the proper solution to the problem of industrial anthrax in the United States. In 1939 approximately 40,000,000 goat skins, 33,000,000 sheep skins, 1,000,000 pig skins, over 3,000,000 calf skins and 4,500,000 horse hides were imported. Furthermore, during

1937 the imports of raw wool amounted to 374,000,000 pounds. Since anthrax has almost a worldwide distribution it would be necessary to disinfect most if not all of these products were the plan to be effective. To attempt to do this at ports of entry would constitute an almost Herculean task. The difficulties of disinfection would be complicated by such factors as storage preliminary to disinfection, neutralization of disinfectants, and storage while drying upon completion of the process. As will be pointed out later in detail, there are so few deaths from industrial anthrax in the United States that the disinfection method would have to be nearly one hundred per cent. safe not to result in more deaths than are at present due to anthrax. Furthermore, it is difficult to dissociate disinfection from the tanning process and had it better be done at the tannery. This however, would not reduce the incidence of anthrax among stevedores and other persons in the transportation industry.

Regardless of the site of the disinfection station the disinfection of all imported hides would be somewhat analagous to building a dam halfway across a stream. It would have practically no influence on agricultural anthrax or on industrial anthrax from native hides, skins, hair and wool. During the seven-year period, 1930 to 1936 inclusive, 87 deaths were reported as due to anthrax in the U. S. Registration Area, or slightly over 12 deaths per year. Of this number 43 deaths, or about 6 deaths per year, occurred in cities of over 10,000 population while 44 deaths, or about 6 deaths per year, occurred in rural areas and towns of less than 10,000 population. These deaths in small localities were probably predominantly due to agricultural anthrax. Since many deaths from almost any cause in large cities occur among non-residents who come to the city for treatment it is quite likely that a considerable but undetermined number of the urban deaths from anthrax are due to agricultural rather than industrial anthrax. Furthermore, since anthrax occurs as an indigenous agricultural problem it is also probable that many of the deaths from industrial anthrax in this country are due to infection from domestic rather than imported hides, skins, hair and wool. On this basis, it is logical to assume that there are less than 6 deaths and probably not more than 3 deaths in the United States each year from anthrax due to imported products.

Dr. Henry Field Smyth, as a result of many years study of anthrax, has obtained some statistics which are of extreme service in aiding us in evaluating this problem. According to his report to the American Public Health Association in 1939 there were 378 human cases and 61 deaths from anthrax in the United States during the 5-year period 1934-1938 inclusive. Of these, the source of the infection was stated in only 36 deaths and 262 cases. Of the cases in which the source was stated only 58.2 per cent. occurred in industry; of the deaths only 47.3 per cent. occurred in industry. Due to the factor of workmen's compensation this would probably be an overestimate if applied to the total number of cases and deaths. On this basis it is evident that there are on the average about 42 cases and 6 deaths in the United States each year due to industrial anthrax. Since many of these are probably due to the handling of native products, disinfection at ports of entry would only partially solve this problem.

Human anthrax can only be entirely eradicated by eradicating animal anthrax. Due to the present world-wide upheaval it is doubtful if this will be accomplished in the near future. The next most effective step would be the disinfection of all native and imported hides, skins, hair and wool. It is obvious that this is no time to place undue restrictions on industrial production. Due to the present defense emergency the capacity of industry will be strained to provide shoes and woolen garments for at least two million men under arms.

It seems perfectly possible that the Health Department of Philadelphia and the Municipal Hospital for Contagious Diseases may be looking to distant fields for a practical solution to industrial anthrax while the best possible solution in the light of current knowledge lies firmly within their grasp. Since 1928 there have been 81 cases of anthrax in Philadelphia and not a single fatality. This should be a cause for congratulations rather than consternation. It speaks well for the cooperation between industry, plant physicians, the local and State Departments of Health, the State Department of Labor and Industry, and the contagious disease hospital. It is quite probable that adequate medical care in industry, good industrial housekeeping, early diagnosis and prompt treatment will form the basis for control of industrial anthrax for many years to come. In these measures Philadelphia has pioneered. No greater service can be rendered at this time by accurate appraisal of the methods which have made this highly enviable record possible.

















WERT  
BOOKBINDING  
MIDDLETOWN, PA.  
DECEMBER 77  
We're Quality Bound



W3 PE517 1941

24810050R



NLM 05126611 9

NATIONAL LIBRARY OF MEDICINE